A CONTRIBUTION TO THE LOWER DEVONIAN FAUNAS OF MARYLAND

A DISSERTATION
Submitted to the Board of University Studies of The Johns Hopkins University
in conformity with the requirements for the degree of
Doctor of Philosophy

BY
DANIEL WEBSTER OHERN

BALTIMORE
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BY

DANIEL WEBSTER OHERN[1]

ECHINODERMATA

Subbranch PELMATOZOA

Class CRINOIDEA

Order CAMERATA

Family THYSANOCRINIDAE

Genus THYSANOCRINUS Hall

THYSANOCRINUS EUGENIUS n. sp.

Plate XXXVI, Figs. 3-5[2]

Description.—Body medium in size, urn-shaped, truncate dorsally, the infrabasals and the lower parts of the basals forming the base of the body; wall of body almost straight below arm bases. Infrabasals 5, protruding beyond the periphery of column; basals 5, largest of the calyx, extremely convex; posterior basal larger than the rest and truncate above; the 4 lateral basals hexagonal, angular above; radials larger than costals, very convex and prominent heptagonal, angular below, truncate above; costals 2 x 5, very convex, prominent, the first hexagonal, truncate above and below, the second pentagonal, truncate below, angular above, each side of

[1] Manuscript submitted, June, 1907.

[2] All references to figures are to the Lower Devonian report of the Maryland Geological Survey in which these plates and text were published.

angle bearing a distichal; distichals 4 (?) x 10, the first larger than the rest which are transversely elongate, the last one often bearing a short, stout spine; arms 10, simple, biserial, composed of alternating cuneiform plates, and often bearing at fairly regular intervals a single spine or even a pair; pinnules not seen; intercostals 3—one in the first series, large hexagonal—two in the second series, hexagonal, smaller than the first and situated above it and between the second costals; interdistichals 5 or more, small; interradial areas much depressed below the radial; anal interradial wider than the others, the first plate large, conspicuous, highly convex, resting on upper truncated edge of posterior basal and between the postero-lateral radials, three plates in the second series, the middle one most prominent and resting directly upon the first series, other series present (indeterminate in specimens examined), the middle one always the more prominent by its convexity. Stem and tegumen unknown.

Four individuals of this species are known to the writer. Of these two have spinose arms while the others seem to be without this feature. Nevertheless, unless further collections show this to be other than a specific variation, all must be regarded as one species.

Occurrence.—ORISKANY FORMATION, RIDGELY MEMBER. Cumberland.

Collection.—U. S. National Museum.

Family MELANOCRINIDAE

Genus TECHNOCRINUS Hall

TECHNOCRINUS SCULPTUS (Hall)

Plate XXXVI, Figs. 10, 11

Mariacrinus (*Technocrinus*) *sculptus* Hall, 1859, Pal. N. Y., vol. iii, p. 143, pl. lxxxvi, figs. 13, 14, 1861.

Description.—"Body unknown. Base urn-shaped, gradually expanding above, abruptly expanded at the junction of the column: cavity for the insertion of the column large. Basal plates marked by strong sharp ridges, which diverge from the base to the upper margins, and unite upon the lines in the direction from the angles to the base of the plates." Hall, 1859.

This species is known only from the basal and first radial plates. The writer has not seen it.

Occurrence.—ORISKANY FORMATION, RIDGELY MEMBER. Cumberland (fide Hall).

Collection.—American Museum of Natural History.

TECHNOCRINUS STRIATUS (Hall)

Plate XXXVI, Figs. 8, 9

Mariacrinus (*Technocrinus*) *striatus* Hall, 1859, Pal. N. Y., vol. iii, p. 142, pl. lxxxvi, figs. 12 and 5-11, 1861.

Description.—"Body unknown. Surface of plates marked by strong elevated striæ, diverging from the center. Basal plates four, wider than long, small. First radial plates wider than high. Column small." Hall, 1859.

This species is known only from the basal and first radial plates. The writer has not seen it.

Occurrence.—ORISKANY FORMATION, RIDGELY MEMBER. Cumberland (fide Hall).

Collection.—American Museum of Natural History.

TECHNOCRINUS ANDREWSI (Hall)

Plate XXXVIII, Fig. 2

Mariacrinus (*Technocrinus*) *andrewsi* Hall, 1859, Pal. N. Y., vol. iii, p. 141, pl. lxxxvi, figs. 1-4, 1861.

Technocrinus andrewsi Wachsmuth and Springer, 1897, Mem. Mus. Comp. Zool., No. 20, p. 306, pl. xxiv, fig. 3.

Description.—"A rather large species. Calyx to the arm bases hemispherical; plates moderately convex, surrounded by sets of short marginal ridges passing inward, three to four to each side of the plate, and by small pits along the sutures; the center of the plates perfectly smooth. Basals wider than high. Radials large, about as long as wide. First costals of the form of the radials, but considerably smaller; the second still smaller, narrower as well as shorter. Distichals one, axillary; supporting in the calyx two rather large palmars, followed by several cuneate, interlocking

free plates, and these by two rows of subquadrangular pieces, united by a sharply zigzag suture. Arms four to the ray, strong, flat, and of almost uniform width throughout. Pinnules contiguous. Interbrachials four or five: 1, 2, 1, 1, all comparatively large. Column round, large, tapering; the joints rather long and slightly rounded exteriorly." Wachsmuth and Springer, 1897.

The writer has seen only the exterior mould of the lower part of the calyx of an individual of this species. It is larger than Hall's type, but the plates that can be made out indicate that it belongs to this species. The type came from Cumberland.

Occurrence.—Oriskany Formation, Ridgely Member. Cumberland (fide Hall), Hancock.

Collection.—Maryland Geological Survey.

Technocrinus spinulosus (Hall)

Plate XXXVII, Figs. 1, 2

Mariacrinus (*Technocrinus*) *spinulosus* Hall, 1859, Pal. N. Y., vol. iii, p. 140, pl. lxxxv, figs. 1-18, 1861.

Technocrinus spinulosus Wachsmuth and Springer, 1897, Mem. Mus. Compt. Zool., No. 20, p. 305, pl. xxii, fig. 3.

Description.—"Calyx subglobose, the arm bases slightly contracting. Plates of the dorsal cup marked by a central spine or node, surrounded by smaller nodes, which vary in number among the plates. From the nodes two to four parallel ridges pass out to the sides, and these are continued upon adjoining plates. Near the arm bases the ridges gradually disappear, and the plates are marked only by a central spine.

"Basals four, of medium size, forming a shallow basin with five sets of four ridges, each set communicating with those upon the radials. Radials and costals nearly as wide as long, decreasing in size upwards; the second costal but half the size of the first. Distichals one to each side of the costal axillaries. The first palmar enclosed in the calyx. Arms twenty, stout, rounded; composed at their bases of cuneate pieces, which interlock farther up, and gradually become biserial. Interbrachials apparently four. All other parts of the calyx unknown. Column slightly pentag-

onal, each alternate joint provided with a node or short spine at the margin." Wachsmuth and Springer, 1897.

Two imperfect specimens from the Oriskany comprise all that the writer has seen. The species is well marked and although the specimens are imperfect they are readily recognized as belonging to this species. Hall's type of this, as of all other species of this genus, was found near Cumberland.

Occurrence.—Oriskany Formation, Ridgely Member. Cumberland.

Collection.—U. S. National Museum.

Technocrinus (?) lepidus n. sp.

Plate XXXVII, Figs. 3-5; Plate XXXVIII, Fig. 1; Plate XXXIX

Description.—Specimen large; calyx cup-shaped, depressed dorsally, somewhat constricted at arm bases; plates generally highly convex, smooth. Basals not discernible in specimens observed; costals 2, second pentagonal and axial; distichals 2 x 10, the first usually hexagonal, the second pentagonal, hexagonal or heptagonal and axillary; palmars 2 x 20, of irregular shape, each second one bearing an arm; intercostals 3, one in the first series, hexagonal, situated above and between the radials and between the first costals, two in the second series, situated between the second and costals, and above and between the second costals and the intervening intercostal of the first series; interdistichals several (7-10), of irregular size, shape and arrangement, all smaller than the corresponding distichals, some much smaller; interpalmars about 5, variable in size, arrangement and shape; interaxillaries 3, with supplementary smaller ones between the bases of the arms, the first interaxillary situated above and between the first costals, the second and third succeeding in order, each limited laterally by the palmars; between the bases of each pair of arms originating from the same costal is one or more small plates.

Arms 20, biserial, extremely long and carrying multitudinous long pinnules, composed of several acutely spheroid alternating plates which are followed by regularly arranged alternating cuneiform plates. The lower plates of the calyx cannot be made out with certainty in any of the specimens at hand. The genus Technocrinus has been found so far only

in the Oriskany of Maryland. To it are referred provisionally certain large, pinnuliferous specimens from the region of Hancock. These are all in the form of natural moulds of the exterior. The interior casts are also found, but in the latter no arrangement of plates can be made out. The chief difference between the genus as defined by Wachsmuth and Springer and the specimens here referred to it, is in the distichals. When, however, it is remembered that the definition of the genus was based on two species, it is not surprising that such deviations should arise as other species are discovered. Mr. Springer, to whom the specimens under consideration were submitted, would refer them provisionally to this genus and the writer is of the opinion that further collections will show this to be correct. In one specimen the arms measure more than 22 cm. in length.

Occurrence.—ORISKANY FORMATION, RIDGELY MEMBER. Cacapon Bridge; Pennsylvania Sand Quarry, 3 miles north of Berkeley Springs, West Virginia.

Collection.—Maryland Geological Survey.

Order FISTULATA

Family CALCEOCRINIDAE

Genus CALCEOCRINUS Hall

CALCEOCRINUS MARYLANDICUS n. sp.

Plate XL, Figs. 1-3

Description.—Body robust, laterally compressed. Basal disk of medium size, highly convex. Basals three, probably anchylosed, the suture lines barely discernible. Anterior basal U-shaped, truncate anteriorly. Lateral radials large, irregularly hexagonal, strongly convex and cinctured transversely. Anterior radials small as compared with the laterals, triangular, not in contact, apices ending near the bottom of a deep circular depression. The first brachial of the anterior ray large, wider than high, quadrangular, its lower angles in contact with the lateral radials and lower lateral brachials. The lower lateral brachials two, separated by depression, but evidently joined by syzygy, the suture lines, however, being discernible; the lower one much wider than high, quadrangular, separated from the radial below by a gaping suture; the upper one pentagonal, axial, sup-

porting on its horizontal edge a vertically ascending arm, and on its vertical side another axial plate which likewise bears an arm and a plate and so on until the number of lateral arms is eight; the axial plates form a marked ridge running along the bases of the arms. Lateral arms cylindrical, branching at about every fourth joint, which is nodose. Anterior arm much more robust than the lateral, cylindrical, its plates separated by deep incisions, not branching at least below the twelfth plate. Anal plates two, triangular, separated from the basal disk by a deep semicircular fossa, and truncate above.

The upper surfaces jointly support a large anal tube which is larger at its base than the anterior arm, and decreases in size upward at least to the third plate where the tube disappears within the enfolding lateral arms. The posterior half of this anal tube is composed of large semicylindrical plates, but the anterior (interior) portion is invisible. Stem robust, composed evidently of plates uniform in size. The species is based on a specimen in the Museum of the Maryland Academy of Sciences collected by John Widgeon. This specimen seems, however, quite distinct from any heretofore described, and so far as the writer knows is the first occurrence of this genus in the Lower Devonian. The writer is informed that when found the stem was separated from the calyx so that only presumably are they the same individual. The upper portion of the arms has been broken off.

Occurrence.—Oriskany Formation, Ridgely Member. Quarry opposite Keyser, West Virginia.

Collection.—Maryland Academy of Sciences.

Family CYATHOCRINIDAE

Genus HOMOCRINUS Hall

Homocrinus proboscidalis Hall

Plate XL, Figs. 4, 5

Homocrinus proboscidalis Hall, 1859, Pal. N. Y., vol. iii, p. 138, pl. lxxxv, figs. 24, 25, 1861.

Description.—"Body subturbinate; base large. Basal plates wider than long, hexagonal. Radial plates about as long as wide; brachial plates resting upon the truncated edges of the radial plates.

"Arms bifurcating upon the third brachial plate, and again upon the third and fifth or sixth plate above the first bifurcation: bifurcation apparently equal. Proboscis long, fusiform, very slender below, and acquiring its greatest diameter at about two-thirds the distance from base of body to summit of proboscis. Column unknown." Hall, 1859.

The writer has not seen this species.

Occurrence.—Oriskany Formation, Ridgely Member. Cumberland (fide Hall).

Collection.—American Museum of Natural History.

Homocrinus hartleyi n. sp.

Plate XL, Fig. 6

Description.—Calyx small, broadly invert-conical, expansion regular from base of calyx to base of arms. Under basals 5, pentagonal, the lateral edges converging downward, lower edge coincident with the faces of the column. Basals large, largest of the calyx, convex, the four laterally situated are pentagonal, the posterior hexagonal and truncate above bearing the anal. Radials alternating with the basals and resting above and between the four simple and pentagonal, the right posterior one being not easily made out, but apparently unlike others, upper edge of all notched but not profoundly. Anal large. Lower arm plates rather small, wider than high and profoundly convex, making the calyx deeply excavated between the arm bases. Column pentagonal, enlarged above. Arms and tegmen unknown.

The species is based on one specimen in the collection of Mr. Hartley, but is quite clearly marked as a new species. It is larger than any other American form referred to this genus known to the writer except *Homocrinus polyxo* (Hall) from the Waldron Niagara. It has not, however, the interplate ridges of that species and the radially situated plates are not so deeply notched.

Occurrence.—Oriskany Formation, Ridgely Member. Cumberland.

Collection.—Frank Hartley.

Family AGASSIZOCRINIDAE

Genus EDRIOCRINUS Hall

Edriocrinus sacculus Hall

Plate XL, Figs. 7-12

Edriocrinus sacculus Hall, 1859, Pal. N. Y., vol. iii, p. 143, pl. lxxxvii, figs. 1-22, 1861.

Edriocrinus sacculus Weller, 1903, Geol. Survey N. J., Pal., vol. iii, p. 342, pl. xlv, figs. 3-5.

Description.—"Body more or less obconic or turbinate below and cylindrical above, varying in its proportions of length and breadth. Base varying in form from turbinate to hemispheric, solid, often obliquely truncate or indented below: upper margin marked by six subangularly concave depressions for the insertion of the radial and anal plates. Radial plates large, longer than wide, inserted into the depressions in the margin of the base, gradually expanding towards the upper margin which is thickened externally, slightly concave for the reception of the plates of the arm. Arms broad at the base, composed of numerous very short transversely linear plates, of which ten or twelve or more occur below the first bifurcation: first bifurcation in the middle, and each side again bifurcating on the third or fourth plate above, with each division bifurcating once or twice beyond this; making eight or ten or more divisions at the extremities. Anal plates two, the lower large and of the same form as the radial plates; the second one small and short. Proboscis and summit unknown. Column, none; affixed to foreign bodies by the solid base." Hall, 1859.

This is the most common crinoid of the Oriskany. Usually the arms have been broken off but in the fine collection of Mr. Hartley is a group of two, both of which are nearly perfect, and others preserving fragments of the arms. It was upon collections from Cumberland that Hall based his original description and account of the habits of the genus.

Occurrence.—Oriskany Formation, Ridgely Member. Cumberland, Knobly Mountain, near Cumberland; east side Nicholas Mountain and elsewhere in Maryland; Franklin, West Virginia.

Collections.—Maryland Geological Survey, U. S. National Museum.

Edriocrinus pocilliformis Hall

Plate XL, Figs. 13-15

Edriocrinus pocilliformis Hall, 1859, Pal. N. Y., vol. iii, p. 121, pl. v, figs. 8-12, 1861.

Edriocrinus pocilliformis Meek and Worthen, 1868, Geol. Survey Ill., vol. iii, p. 370, pl. vii, figs. 5*a*, *b*.

Edriocrinus pocilliformis Keyes, 1894, Missouri Geol. Survey, vol. iv, pt. i, p. 221, pl. xxx, fig. 7.

Edriocrinus pocilliformis Talbot, 1905, Amer. Jour. Sci., 4th ser., vol. xx, p. 23, pl. iv, figs. 1-6.

Description.—"Base hemispheric or subturbinate, often less than a hemisphere, externally smooth or finely granulate: upper margin scolloped with five large and one smaller depression for the insertion of the radial and anal plates. Interior more or less deeply concave, with depressions corresponding to those on the edge of the cup; the concavity not parallel to the exterior convexity. Radial plates and arms unknown." Hall, 1859.

"Infrabasals present but so fused that their number is uncertain. Height from one-half to two-thirds that of the cup as ordinarily found. Basals five, completely fused with each other and with the infrabasals or distinguished from the latter as a narrow protruding band. Suture lines sometimes apparent on the interior. Upper margin scolloped for the attachment of the radials and the anal plates. Height about half that of the infrabasals. Radials five, often as high as the infrabasals and basals combined, and like them, fused to form a part of the cup. In most instances, however, the suture lines between the radials are plainly discernible. As a rule, the union between the radials and basals is not so strong as that of basals with infrabasals; and the cup is generally broken off at the top of the basals. Since in no specimens are brachials preserved, the union of brachials with radials must have been still weaker. Anal plates as high as the radials, but only half as wide. Radials and anal gently convex, sloping in all directions from the center of the plate. Arms and ventral disc unknown. The attachment scar is visible on a number of specimens, and in some is a short distance up on the side of the cup, rather than on the bottom." Talbot, 1905.

Occurrence.—Helderberg Formation, New Scotland Member. Cumberland, Maryland; Cherry Run, West Virginia.

Collections.—Maryland Geological Survey, U. S. National Museum.

VERMES

Class ANNELIDA

Genus CORNULITES Schlotheim

Cornulites cingulatus Hall

Plate XL, Fig. 16

Cornulites cingulatus Hall, 1888, Pal. N. Y., vol. vii, p. 20 (supplement to vol. v), pl. cxvi, fig. 29.

Cornulites cingulatus Clarke, 1900, Mem. N. Y. State Mus., vol. iii, No. 3, p. 27, pl. ii, figs. 35-38.

Cornulites cingulatus Weller, 1903, N. J. Geol. Survey, Pal., vol. iii, p. 272, pl. xxxii, fig. 3.

Description.—"Tube very flexuous, with regularly transverse but unequally distant, sharply angled or evenly rounded annulations." Hall, 1888.

"Shell having the form of a gradually tapering, more or less curved or flexuous, annulated cone. On the internal casts the annulations have the aspect of insheathed cones, the slope being abrupt below and gradual above. The width of the annulations is variable, but is usually a little less than 1 mm.; they are somewhat irregular, there occasionally being one which does not entirely surround the tube." Weller, 1903.

A single specimen from the Keyser member appears to belong to this species and is the only one which the writer has seen from the Lower Devonian of the State.

Occurrence.—Helderberg Formation, Keyser Member. Pinto.

Collection.—U. S. National Museum.

MOLLUSCA

Class PELECYPODA

Order PRIONODESMACEA

Section SCHIZODONTA

Superfamily PTERINACEA

Family PTERINEIDAE

Genus PTERINEA Goldfuss

Pterinea halli Clarke

Plate LXXVIII, Figs. 11, 12

Avicula securiformis Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 290, pl. liii, figs. 11-14, 1861.
Pterinea halli Clarke, 1903, Bull. N. Y. State Mus., No. 5, p. 495.

Description.—"Shell subrhomb ovate, slightly oblique; length and height varying from nearly equal, to the height one-fourth greater than the width, moderately convex in the middle and on the umbo: anterior margin long, slightly concave above and curving to the base; posterior margin below the sinus, somewhat abruptly curving into the broad rounded basal margin: anterior wing small, trigonal, subacute, distinctly separated by a sinus from the body of the shell; posterior wings large, subacute at the extremity, not strongly distinct from the body of the shell, extending as far as, or a little beyond, the margin of the shell; marginal sinuosity long and shallow. Surface marked by moderately strong radiating costæ and strong elevated concentric striæ." Hall, 1859.

To this species is referred a fragment which has the sculpture and outline, as far as this latter can be made out, of Hall's species. It is freely admitted that such reference is a mere conjecture.

Occurrence.—Oriskany Formation, Ridgely Member. Cumberland.

Collection.—George M. Roeder.

Genus LEPTODESMA Hall

Leptodesma ? sp.

Plate LXXV, Fig. 2

Description.—Three incomplete internal casts whose outlines and other characters cannot be made out with certainty are tentatively referred to this genus. The ligamental area is long and wide and longitudinally striated. Beneath the beaks are several fine transverse teeth, and posterior to the beak is a hinge margin evidently corresponding to a tooth in the shell. The anterior extremity seems to be neither nasute nor auriculate. The anterior muscular impression is small and deep. In the cast the position of pallial line is marked anteriorly by a sharp ridge. A part of an exterior from the same rock mass shows the surface of the shell to be marked only by irregular concentric growth lines.

Length 5.5 cm.; height 4.5 cm.

Occurrence.—Oriskany Formation, Ridgely Member. Rock Enon Springs, Virginia.

Collection.—U. S. National Museum.

Family AMBONYCHIIDAE

Genus MYTILARCA Hall

Mytilarca marylandica n. sp.

Plate LXXV, Figs. 3, 4

Description.—Shell inequivalve, slightly inequilateral, convex, depressed, subtrigonal in outline; anterior side concave beneath beaks, thence broadly rounded, antero-ventral margin truncate, posterior extremity sharply rounded to subangular. Beaks prominent, approximate. Left valve convex, the maximum inflation being in the umbonal region; right valve less convex, much depressed toward ventral side. Muscular markings and exterior ornamentation not seen.

Length 20 mm.; height 24 mm.

The specimen figured is a cast of the interior, the only individual seen. The truncation of the postero-ventral side seems due, in part at least, to poor preservation, and the irregularity in the outline of the anterior

margin is caused by mechanical displacement of a portion of the cast. The precise horizon from which this species comes is unknown.

Occurrence.—Helderberg Formation. Cumberland.

Collection.—George M. Roeder.

Mytilarca cordiformis (Hall) ?

Plate LXXV, Figs. 5, 6

Megambonia cordiformis Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 278, pl. l, figs. 6*a*, *b*, 1861.

Description.—"Shell cordiform, extremely gibbous from the base upwards to the umbones, which are elevated and incurved, not compressed at the basal or lateral margins; anterior cardinal extremity slightly auriculate, the prominence covering the muscular impression small. Surface marked by concentric lamellose striæ." Hall, 1859.

Two specimens in the collection of Mr. George M. Roeder from an unknown horizon appear to belong to this species. In both specimens both valves are present. The individuals are smaller than Hall's figure but in other respects are very similar.

Occurrence.—Helderberg Formation. Cumberland.

Collection.—George M. Roeder.

Subgenus PLETHOMYTILUS Hall

Mytilarca (Plethomytilus) rowei n. sp.

Plate LXXV, Fig. 7

Description.—Shell equivalve; not strongly inequilateral; gibbous; broadly ovate; umbonal slope expanding somewhat rapidly from umbones to about one-fourth or one-third the length of the shell, then arching broadly and gently to the postero-basal margin, sloping gradually to the postero-dorsal and suddenly to the antero-basal margin; postero-dorsal margin almost rectilinear to about three-fourths the length of the shell, posterior extremity subcircularly rounded, basal margin broadly rounded, anterior margin rectilinear (?) to beak; beaks prominent, approximate. Surface of interior smooth, interrupted irregularly by broad, often discontinuous, concentric furrows. Hinge-line not seen.

Greatest length 73 mm.; greatest width 55 mm.

All the specimens seen are casts of the interior, but there is little doubt as to the generic affinities. The naming of the species is a humble compliment to the late Dr. R. B. Rowe.

Occurrence.—Oriskany Formation, Ridgely Member. Hancock.

Collection.—Maryland Geological Survey.

Family PINNIDÆ

Genus PALEOPINNA Hall

Paleopinna lata n. sp.

Plate LXXVI, Fig. 1

Description.—Shell large, very oblique, axis and hinge-line making an angle of about 23°; greatest length to greatest height as about 3 to 4; anterior margin truncate and emarginate, ventral margin broadly and regularly curving, posterior margin more rapidly rounding and recurving to meet the hinge-line; left valve gibbous in middle and anteriorly, depressed posteriorly and dorso-posteriorly; right valve not known. Umbo wide, beak probably extending to posterior limit of body; a narrow ridge extending from beak (?) along hinge-line to posterior end of dorsal margin. Interior marked by broad obsolete growth lines. Exterior unknown.

Length 8.75 cm.; height 6 cm.

The description is from the cast of the interior of the left valve of a single specimen. It has all the marks of this genus and is readily separable from the other species of this genus by its great breadth. A part of the postero-dorsal extremity and of the beak is broken off.

Occurrence.—Oriskany Formation, Ridgely Member. Hancock.

Collection.—Maryland Geological Survey.

Family PTERIIDAE

Genus ACTINOPTERIA Hall

Actinopteria communis (Hall)

Plate LXXVI, Figs. 2-4

Avicula communis Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 286, pl. lii, figs. 1-7; pl. liii, figs. 1, 4, 6, 1861.

Actinopteria communis Clarke, 1900, Mem. N. Y. State Mus., No. 3, vol. iii, p. 34, pl. iv, figs. 1, 2.

Actinopteria communis Weller, 1903, Pal. N. J., vol. iii, p. 292, pl. xxxi, fig. 21.

Description.—"Shell obliquely ovate; the left valve gently convex in the middle, and becoming gibbous towards the beak, which in the young shell is narrow and projecting above the hinge-line; right valve flat or gently concave in the middle and below, and becoming slightly convex on the umbo; anterior side gently curving to the base which is broadly rounded, the curvature of the posterior side being more abrupt: anterior wing small, trigonal, obtuse at its extremity, strongly defined from the body of the shell: posterior wing three times as long as the anterior wing, obtusely or subacutely pointed, extending more or less beyond the margin of the shell, concave on the outer or lateral margin, its junction with the body of the shell not strongly defined.

"Surface of the left valve marked by slender, sharply defined, rounded radii, the principal of which are distant from two to four or five times their width, and the spaces occupied by one, two or three finer interstitial radiating striæ (these radii are but faintly, and sometimes not at all perceptible on the posterior wing, except along its upper margin, while they are not seen on the anterior wing); concentrically marked by fine lamellose striæ, which, in the more perfectly preserved surfaces, are elevated and subimbricating: these striæ are usually conspicuous on both the anterior and posterior wings. Surface of the right valve marked by broader and scarcely elevated radii and less defined concentric striæ." Hall, 1859.

This species is rare in the Lower Devonian of Maryland. That it is subject to wide variations is apparent from Hall's figures, and it may be questioned whether that author has figured but one species. However, no further light can be obtained from the few Maryland forms.

Occurrence.—Helderberg Formation, Keyser Member. Cumberland, Tonoloway ? Coeymans Member. Dawson, Corriganville. New Scotland Member. Dawson, Devil's Backbone. Horizon unknown. Miller's Spring, Cedar Cliff, West Virginia. Oriskany Formation. Locality not known.

Collections.—Maryland Geological Survey, U. S. National Museum.

Actinopteria communis (Hall) var.

Description.—A few imperfect specimens from the Oriskany resemble in a general way *A. communis* (Hall). The left valve shows fine, alter-

nating striæ, crossed by finer, concentric striæ, giving to the whole a cancellated effect which is somewhat more marked on the posterior wing. These specimens are very like those figured by J. M. Clarke under this species and may be wholly identical with them. It seems best, however, to designate them as a variety, but their fragmentary condition will not permit definition.

Occurrence.—Oriskany Formation, Ridgely Member. Winchester Road and Miller's Spring near Cumberland.

Collection.—Maryland Geological Survey.

Actinopteria textilis (Hall)

Plate LXXVI, Fig. 5

Avicula textilis Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 288, pl. lii, figs. 9, 10 ?; pl. liii, figs. 2, 3, 5, 7, 10, 1861.

Actinopteria textilis Weller, 1903, Pal. N. J., vol. iii, p. 332, pl. xliii, figs. 13, 14.

Description.—"Body of the shell obliquely subovate; length about once and a half the height, becoming regularly convex from the base, gibbous in the middle, and gently depressed along the line of junction with the posterior wing; ventral margin very regularly and broadly curved; hinge-line greatly extended: posterior wing long, nearly three times its greatest width, the extremity extending beyond the margin of the shell, the margin moderately sinuate. Surface marked by regular strong radiating ribs, which, at the base, are distant from each other three times their width; the intermediate space marked by a central finer ray, and, on each side between it and the larger costæ, are one or two still finer rays, which are scarcely perceptible to the naked eye: these are crossed by concentric ridges, giving a cancellated surface and a slightly nodose character to the larger costæ. The wing is marked by strong radiating and concentric striæ, which are of nearly equal size, and slightly nodose at their junction." Hall, 1859.

Length 4.7 cm.; height 4.5 cm.

Occurrence.—Helderberg Formation, New Scotland Member. Cumberland, Dawson.

Collections.—Maryland Geological Survey, George M. Roeder.

Actinopteria textilis var. arenaria (Hall)

Plate LXXVII

Avicula textilis var. *arenaria* Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 465, pl. cix, figs. 1, 2; pl. cx, fig. 2, 1861.

Avicula textilis var. *arenaria* Weller, 1903, Pal. N. J., vol. iii, p. 360, pl. l, fig. 1.

Description.—"Shell large, obliquely subovate; the proportions of length and height variable. Left valve becoming moderately and regularly convex from the base, the greatest convexity being about the first third below the hinge-line. Posterior wing large, extending along the margin of the body of the shell halfway from beak to base. Anterior wing small, triangular, wrinkled. The right valve is slightly concave, smaller than the other, faintly marked by the radiating ribs, which sometimes are scarcely seen. Surface marked by strong radiating ribs sometimes regularly dichotomizing and subequal, and in other specimens quite unequal, showing a few stronger ribs, with several finer ones between, and these are crossed by strongly elevated imbricating lamellæ." Hall, 1859.

Several specimens from the Oriskany of the state are referred to this variety. The close resemblance between *A. communis,* the typical *A. textilis* and the varietal form, casts doubt upon the identification of the forms as they occur in Maryland.

Occurrence.—Oriskany Formation, Ridgely Member. Warren Point, Pennsylvania; west side of Queen's Point opposite Keyser, Miller's Spring, West Virginia.

Collections.—Maryland Geological Survey, U. S. National Museum.

Actinopteria virginica n. sp.

Plate LXXVIII, Figs. 1, 2

Description.—Body of the shell obliquely ovate, gibbous, maximum inflation about one-third the distance from the beak to the base. From this point the shell arches rapidly to the beak and gently to base; contracts rapidly on either side of the umbo near the beak and less so as the distance from beak increases; beaks not prominent; posterior wing not sharply

separated from body, convex; anterior wing not seen; anterior extremity suddenly rounded, basal margin broadly and regularly arcuate, posterior extremity broadly rounded; surface of body covered by low, arched, radiating ribs, between which, toward the margin, finer ones are interposed; posterior wing unornamented. Hinge-line straight.

The description is from a cast of the interior of a left valve which is not quite complete. The species bears some resemblance to *A. recticosta* Hall, but the general outline and the character of the radiating ribs at once separate it. Another imperfect cast in the Maryland Geological Survey collection is doubtfully referred to this species. It is, however, more oblique, the large ribs are smaller and the small ones larger in proportion than the specimen described. It is not improbable that further collections will separate this as another species, the material now in hand not warranting such procedure.

Length 6.5 cm.; height 4.5 cm.

Occurrence.—Oriskany Formation, Ridgely Member. Near Fountain, four miles southwest of Keyser, West Virginia; Hancock, Maryland.

Collections.—Maryland Geological Survey, U. S. National Museum.

Genus AVICULA Klein

Avicula recticosta Hall ?

Plate LXXVI, Fig. 7

Avicula recticosta Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 466, pl. cix, fig. 3, 1861.

Description.—"Shell slightly oblique, subrhomboidal: hinge-line greater than the greatest width of the shell below; width equal to about once and a third the height, very moderately convex. Posterior wing large, extending nearly as far backwards as the posterior margin of the shell. Anterior wing smaller, triangular, slightly concave on the outside. Surface marked by strong dichotomizing subequal ribs, which proceed principally in pairs from the umbo to the margin of the shell. Posterior wing with fine radiating ribs and close concentric laminæ; the anterior wing being marked only by the concentric striæ." Hall, 1859.

To this species is referred, doubtfully, a single fragmentary individual.

Occurrence.—Oriskany Formation. Locality unknown.

Collection.—Robert H. Gordon.

Section ISODONTA

Family PECTINIDAE

Genus AVICULOPECTEN McCoy

Aviculopecten (?) cumberlandensis n. sp.

Plate LXXVIII, Fig. 3

Description.—Shell subcircular, length and height about equal; slightly oblique; left valve gibbous, the maximum inflation being anterior to the center of the shell which curves thence steeply to the anterior, and much less so to the basal and posterior margins; anterior margins broadly sinuate at junction of anterior wing and the body of the shell, thence slightly convex outward to anterior extremity, thence the margin is almost semicircular to the posterior wing which is widely sinuate, the maximum excavation being at about two-thirds the distance from the extremity of the wing to the body of the shell; anterior wing small, concave; posterior wing large, convex, the extremity being nearly a right angle and on line with the posterior extremity of the body; hinge-line straight, equal to greatest width of shell. Surface of body ornamented with coarse, radiating ribs which are subequal on the anterior, and alternating on the central and posterior parts; the radiating ribs are crossed by finer concentric striæ and irregular growth lines; surface of posterior wing ornamented with alternating ribs which are somewhat finer than those of the body and crossed by concentric striæ, the two sets of markings giving a cancellated effect.

Right valve and interior not seen. The description is from a single left valve, which is figured. The label has been lost but the specimen is no doubt from the Helderberg, as is shown by other fossils in the rock mass.

Length about 5 cm.; height 5.2 cm.

Occurrence.—Helderberg Formation. Locality unknown.

Collection.—Maryland Geological Survey.

Section DYSODONTA

Superfamily MYTILACEA

Family MODIOLOPSIDAE

Genus MEGAMBONIA Hall

Megambonia lamellosa Hall

Plate LXXVIII, Fig. 5

Megambonia lamellosa Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 467, pl. cix, figs, 5, 6, 1861.

Description.—"Shell obliquely ovoid, very gibbous in the middle and towards the umbo; the body of the shell rather abruptly narrowed above the middle. Anterior wing short, rounded, very convex, separated from the body of the shell by a broad rounded depression, leaving a sinus in the margin. Posterior wing broad triangular, extending more than two-thirds the entire length of the posterior slope; its junction with the body of the shell marked by a depression. Surface marked by concentric lamellose striæ, which, on some parts of the specimens, are very prominent. Faint remains of radiating striæ are sometimes perceptible on the casts." Hall, 1859.

It has been found only in the form of casts, but it is not uncommon in the Oriskany of Maryland.

Length about 3.5 cm.; height 2.5 cm.

Occurrence.—Oriskany Formation, Ridgely Member. Queen's Point opposite Keyser, Miller's Spring, and Knobly Mountain, West Virginia; near Cumberland, Hancock, Maryland.

Collections.—Maryland Geological Survey, U. S. National Museum.

Order TELODESMACEA

Superfamily CYPRICARDIACEA

Family PLEUROPHORIDAE

Genus CYPRICARDINIA Hall

Cypricardinia sublamellosa Hall

Plate LXXVIII, Fig. 8

Cypricardinia sublamellosa Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 267, pl. i, fig. 1, 1861.

Description.—" Shell transversely elongated; anterior extremity contracted; umbones very depressed; posterior slope convex, without a defined ridge; extremity somewhat acutely rounded. Surface marked by rounded concentric striæ or ridges, which are more prominent on the posterior half of the shell." Hall, 1859.

Occurrence.—HELDERBERG FORMATION, NEW SCOTLAND MEMBER. Devil's Backbone.

Collection.—Maryland Geological Survey.

INCERTAE SAEDES

Genus ILIONIA Billings

ILIONIA SINUATA (Hall)

Plate LXXVIII, Figs. 9, 10

Anatina ? sinuata Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 265, pl. xlix, figs. 3*a-d*, 1861.

Description.—" Shell thin, equivalve, compressed, inequilateral, subrhomboid, with the posterior side much wider than the anterior; posterior? rounded, much compressed near the extremity, with a distinct shallow groove extending from near the beak obliquely to the postero-basal margin, and a second broad groove extending from the hinge-line, immediately behind the beak, vertically to the base of the shell, each one producing a slight sinuosity in the margin of the shell: umbones vertical, or not perceptibly inclined to either side of the shell; anterior cardinal slope nearly flat, compressed and subalate. Surface concentrically marked with fine subimbricating striæ, which are undulated in passing over the depressed lines on the anterior side of the shell." Hall, 1859.

Several specimens from an unknown horizon in the Lower Helderberg are referred to this species but not without doubt. All are in the form of interior casts and none have the outline sufficiently complete to permit restoration. Nevertheless, from the entire collection enough can be gathered to show a very close resemblance to Hall's figures and description. The Maryland forms are in general much larger than those figured by Hall.

Occurrence.—Helderberg Formation. East of Martin Mountain, Allegany County, on road leading to Rush.

Collection.—Maryland Geological Survey.

Class GASTROPODA

Subclass STREPTONEURA

Order ASPIDOBRANCHIA

Suborder RHIPIDOGLOSSA

Family PLEUROTOMARIDAE

Genus PLEUROTOMARIA Defrance

Pleurotomaria labrosa Hall

Plate LXXX, Fig. 1

Pleurotomaria labrosa Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 339, pl. lxvi, figs. 1-5; pl. lvii, figs. 6*a*, *b*, 1861.

Description.—"Shell rhomboid ovate. Spire little elevated above the body of the shell: volutions three or four; the upper ones small and moderately increasing, the last one ventricose, much expanded on the outer side, and subangular: aperture broadly ovate; the columellar lip extremely thickened, the callosity extending to the outer lip. Surface marked by prominent spiral ridges with wider furrows between, and, on the upper part of the volution, by a broader band or groove, which is margined by carinæ: lines of growth marked by strong elevated lamellose striæ, which are undulated in passing over the spiral ridges; those marking the broader spiral band are less strongly elevated, and make a single retral curve, indicating the marginal sinus." Hall, 1859.

Occurrence.—Helderberg Formation, New Scotland Member. Cumberland.

Collection.—George M. Roeder.

Family BELLEROPHONTIDAE

Genus BELLEROPHON Montfort

Bellerophon cf. auriculatus Hall

Plate LXXIX, Figs. 1, 2

Bellerophon auriculatus Hall, 1852, Nat. Hist. N. Y., Pal., vol. ii, p. 334, pl. lxxvi, figs. 7*a*, *b*.

Description.—"Convolute; volutions somewhat flattened from the dorsal side; last volution rapidly enlarging; aperture expanded, curving outwards and nearly reflexed at the lateral angles. The remains of a carina, with arched striæ diverging therefrom, are visible upon the dorsal side." Hall, 1852.

Several specimens in the collection of Mr. Roeder are tentatively referred to in this species. In general aspect they resemble Hall's figures very closely, but are much smaller. Precise horizon unknown.

Diameter of shell 1.5 cm.; of aperture 1.5 cm.

Occurrence.—Helderberg Formation. Cumberland.

Collection.—George M. Roeder.

Genus CYRTOLITES Conrad

Cyrtolites expansus Hall

Plate LXXIX, Figs. 5, 6

Cyrtolites ? expansus Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 479, pl. cxiv, figs. 4, 5, 1861.

Cyrtolites expansus Clarke, 1900, Mem. N. Y. State Mus., vol. iii, No. 3, p. 28, pl. iii, figs. 20-23.

Description.—"Shell obliquely depressed conical; the apex incurved, but making scarcely or no more than, a single volution, very rapidly expanding from the apex; the body ventricose; subcarinate on the dorsum: aperture nearly circular. Surface of cast marked by faint transverse ridges and finer longitudinal striæ." Hall, 1859.

". . . . characterized: 1 by the sharply concentric lamellæ of the surface; 2 by the broadly expanded aperture; 3 by the well-defined median ridge on the earlier parts of the shell, on which the striæ have a pronounced retral bend, the ridge being obsolete at the margin." Clarke, 1900.

In the collection of Mr. George M. Roeder is to be found the only entire specimen which the writer has seen from Maryland. The agreement with Hall's description is very exact.

Diameter of shell 6.2 cm.; of aperture 4.75 cm.

Occurrence.—Oriskany Formation, Ridgely Member. Williams Road near Cumberland.

Collections.—Maryland Geological Survey, George M. Roeder.

Order CTENOBRANCHIATA

Suborder PLATYPODA

Superfamily GYMNOGLOSSA

Family PYRAMIDELLIDAE

Genus LOXONEMA Phillips

Loxonema fitchi Hall

Plate LXXIX, Fig. 7

Loxonema fitchi Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 296, pl. liv, figs 9, 11*a*, *b*, 1861.

Description.—"Shell subfusiform, very gradually attenuate: volutions seven or eight. Surface unknown." Hall, 1859.

Volutions broadly arched, wide, suture deeply impressed. A few imperfect casts which may be from the Helderberg agree well with Hall's description and figures. In the state of their preservation no further features can be observed.

Occurrence.—Helderberg Formation. Tonoloway.

Collection.—Maryland Geological Survey.

Superfamily TAENIOGLOSSA

Family LITTORINIDAE

Genus HOLOPEA Hall

Holopea sp.

Description.—A large specimen, coming from an unknown horizon in the Lower Devonian, was studied, which evidently belongs to this genus, but whose condition of preservation does not permit identification or de-

scription. In general aspect it is not unlike *H. antiqua,* but any attempt at further identification is hazardous till further collections are made.

Occurrence.—Helderberg Formation. Cumberland.

Collection.—George M. Roeder.

Holopea sp.

Plate LXXIX, Fig. 9

Description.—The large specimen figured represents a form which is referred with doubt to this genus. A part of the body whorl has been broken off, all surface features have been obliterated and the whole shell laterally compressed, thus making identification impossible. The writer is very much in doubt as to the horizon to which this specimen belongs.

Length 4 cm.; diameter 3.2 cm.

Occurrence.—Helderberg Formation. Cumberland.

Collection.—George M. Roeder.

Genus ORTHONYCHIA Hall

Orthonychia tortuosa (Hall)

Plate LXXIX, Figs. 10-12

Platyceras tortuosum Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 472, pl. cxiii, figs. 1-5, 1861.

Orthonychia tortuosa Clarke, 1900, Mem. N. Y. State Mus., vol. iii, No. 3, p. 30.

Platyceras tortuosum Weller, 1903, Geol. Survey N. J., Pal., vol. iii, p. 362, pl. xlix, figs. 13-17.

Description.—" Shell spirally ascending, making a little more than one free volution: volutions widely separated, very gradually increasing in size towards the aperture, which is scarcely expanded; peristome very oblique. A broad spiral fold sometimes marks the inner side of the spire." Hall, 1859.

Surface marked by irregular, undulating lamellæ, the undulations evidently marking the position of sinuses. As high as three distinct folds are observable on the interior of the spire.

Length 5 cm.; maximum diameter 3 cm.

Occurrence.—Oriskany Formation, Ridgely Member. Devil's Backbone, Hancock, Knobly Mountain near Cumberland.

Collections.—Maryland Geological Survey, Maryland Academy of Sciences.

Genus PLATYCERAS Conrad

Platyceras nodosum Conrad

Plate LXXIX, Figs. 13, 14

Platyceras nodosum Conrad, 1841, Ann. Rept. Pal. N. Y., p. 56.
Platyceras nodosum Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 473, pl. cxv, figs. 1-6; pl. cxvi, figs. 1-4, 1861.
Platyceras nodosum Clarke, 1900, Mem. N. Y. State Mus., No. 3, vol. iii, p. 31.

Description.—"Subfalcate, with numerous thick obtuse nodes. This is a cast in the sandstone, and the shell was probably covered with spines. Length two inches." Conrad, 1841.

"Shell obliquely subovate: volutions contiguous, about two or three, very rapidly expanding from the apex; summit of the spire on a plane with, or a little above, the outer volution; aperture round. Surface marked by round obtuse nodes and strong interrupted or tortuous lamellose striæ." Hall, 1859.

This species in its typical form with well-marked nodes, has been found only in the Oriskany formation at Warren Point. However, several localities furnish specimens with irregular swellings. Such specimens are doubtfully referred to this species.

Diameter of shell 6.5 cm.; of aperture 5 cm.

Occurrence.—Oriskany Formation, Ridgely Member. Cumberland, east side of Nicholas Mountain, Maryland; Warren Point, Pennsylvania.

Collection.—Maryland Geological Survey.

Platyceras gebhardi Conrad

Plate LXXX, Figs. 2-9

Platyceras gebhardi Conrad, 1840, Ann. Rept. N. Y. Geol. Survey, p. 206.
Platyceras gebhardi Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 312, pl. lvi, figs. 5*a*, *b*, 6, 7, 9; pl. lv, figs. 6*a*, *b*; p. 474, pl. cxvii, figs. 1-10, 1861.
Platyceras cf. *gebhardi* Clarke, 1900, Mem. N. Y. State Mus., No. 3, vol. iii, p. 30, pl. iii, fig. 29.
Strophostylus gebhardi Weller, 1903, Geol. Survey N. J., Pal., vol. iii, p. 318, pl. xxxix, figs. 1-3.

Description.—"Shell obliquely subovate or subglobose, somewhat gradually expanding, and becoming ventricose in the last volution. Spire composed of about four volutions, which are contiguous except the last one near the aperture, the apex being nearly in the plane of the outer volution: aperture expanded, campanulate, and sometimes with the lip reflexed. Surface marked by fine transverse undulating striæ, which are sometimes distinctly bent backwards along a line near the dorso-lateral curvature of the shell, or nearer to the middle of the summit, and rarely slightly carinated along this line. In a few specimens, distinct revolving striæ are seen cancellating the transverse striæ." Hall, 1859.

This is the most common species of gastropod in the Lower Devonian of the state. It varies widely in size and in the character of the apex which is sometimes above and sometimes below the plane of the body whorl. See further remarks under var. *ventricosum*.

Occurrence.—Oriskany Formation, Ridgely Member. Knobly Mountain, Monster Rock, opposite Keyser, West Virginia; Nicholas Mountain, Hancock, Cumberland, Flintstone, Maryland; Warren Point, Pennsylvania. Helderberg Formation, New Scotland Member. Cumberland, Maryland; Cherry Run, Miller's Spring, West Virginia; Warren Point, Pennsylvania.

Collections.—Maryland Geological Survey, U. S. National Museum.

Platyceras gebhardi var. ventricosum Conrad

Plate LXXXI

Platyceras ventricosum Conrad, 1840, Ann. Rept. Pal. N. Y., p. 206.
Platyceras ventricosum Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 311, pl. lvi, figs. 1-4, 8; pl. lvii, fig. 4; p. 475, pl. cxviii, figs. 3-9, 1861.
Platyceras ventricosum Meek and Worthen, 1868, Geol. Survey Ill., vol. iii, p. 441, pl. ii, figs. 4*a*, *b*.
Platyceras ventricosum Nicholson, 1874, Rept. upon the Pal. of the Province of Ontario, p. 115, pl. ii, figs. 1, 1*a*.
Platyceras ventricosum Nettleroth, 1889, Kentucky Fossil Shells, p. 168, pl. xxv, fig. 10.

Description.—"Shell ventricose; aperture very large and campanulate; volutions three, contiguous, depressed below the upper margin of the whorl." Conrad, 1845.

"The shell is obliquely ovate spreading rapidly from the apex, and becoming extremely ventricose below; aperture campanulate; the lip in contact with the spire, and sometimes strongly reflexed. Surface marked by fine transverse or concentric lamellose striæ, which are somewhat undulated and rarely finely cancellated by faint, revolving striæ. Volutions contiguous throughout, or the last one free; peristome continuous or interrupted, free or in contact with the body volutions, sometimes abruptly expanded at the margin." Hall, 1859.

This variety is made a species by Hall. In the specimens from Maryland the difference between the typical *Platyceras gebhardi* and the variety is so slight that it cannot be regarded as of specific value. Indeed, it is extremely doubtful if even a varietal difference exists and the writer is of the opinion that further collections will show the complete identity of Hall's two species.

Occurrence.—Oriskany Formation, Ridgely Member. Cumberland, east side Nicholas Mountain, Hancock.

Collection.—Maryland Geological Survey.

Platyceras magnificum Hall

Plate LXXXII, Figs. 1-6

Platyceras magnificum Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 476, pl. cxix, figs. 1-6, 1861.

Description.—"Shell obliquely subovate. Spire depressed below the plane of the outer volution: volutions two or three, very rapidly expanding and becoming extremely ventricose below, usually free or with the first one contiguous; aperture expanded, subcircular, campanulate, and often with the margin reflexed, particularly on the left side. Surface marked by distinct transverse lamellose undulating striæ." Hall, 1859.

Occurrence.—Oriskany Formation, Ridgely Member. Cumberland, east side Nicholas Mountain, Cash Valley, Maryland; Warren Point, Pennsylvania; Miller's Spring, West Virginia.

Collections.—Maryland Geological Survey, U. S. National Museum.

Platyceras subfalcatum n. sp.

Plate LXXXII, Figs. 7, 8; Plate LXXXIII, Figs. 1-3

Description.—Shell subfalcate; whorls (of casts) one; very rapidly expanding from beak to aperture, becoming extremely ventricose, and suddenly contracting at the aperture; surface marked by low, distant, parallel, longitudinal undulations, sometimes becomes slightly nodulose; aperture subcircular; outer surface and peristome not seen. Found only as internal casts.

This species in the character of the undulations, bears some resemblance to *P. platystomum* of the Lower Helderberg of New York; but its shape and the constriction of the aperture show it to be distinct from other species of the genus.

Diameter of shell 4.5 cm. to 8 cm.; of aperture 3.2 cm. to 6 cm.

Occurrence.—Oriskany Formation, Ridgely Member. Hancock.

Collection.—Maryland Geological Survey.

Platyceras patulum Hall

Plate LXXXIII, Fig. 4

Platyceras reflexum Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 477, pl. cxx, fig. 3, 1861.

Description.—"Shell subhemispheric. Spire forming about three volutions, which are usually contiguous, sometimes free, very rapidly expanding, the last one extremely ventricose and assuming a hemispheric form; apex much below the plane of the last volution. Aperture nearly circular; peristome much expanded upon the side of the body volution, and thickening below in the form of a columellar lip. Surface transversely striated." Hall, 1859.

Occurrence.—Oriskany Formation, Ridgely Member. Cumberland.

Collection.—Frank Hartley.

Platyceras reflexum Hall

Plate LXXXIII, Figs. 5, 6; Plate LXXXIV, Figs. 1, 2

Platyceras reflexum Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 477, pl. cxx, figs. 1-7, 1861.

Description.—" Shell spiral, obliquely or arcuately subconical, spirally ascending; the apex consisting of one or two free, but closely approximating volutions; the body volution diverging, and spreading somewhat rapidly towards the aperture: aperture broad, the peristome often sinuous and sometimes abruptly expanded: volutions round or subangular, and rarely distinctly angular, with the aperture subquadrate. Surface transversely striate; the striæ sometimes bent abruptly backwards on the surface, indicating the existence of a marginal notch at some period of growth." Hall, 1859.

Occurrence.—Helderberg Formation, New Scotland Member. Corriganville. Oriskany Formation, Ridgely Member. Cumberland, east side Nicholas Mountain,

Collections.—Maryland Geological Survey, U. S. National Museum.

Platyceras ? callosum Hall

Plate LXXXIV, Figs. 3, 4

Platyceras ? (*Platyostoma* ?) *callosum* Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 478, pl. cxx, figs. 8*a*, *b*, 1861.

Description.—" Shell obliquely ovoid, ventricose. Spire consisting of about three volutions; the apex minute, and the first two volutions nearly in the same plane; the last volution expanding greatly below. Aperture suborbicular: peristome continuous, thickened and coalescing with the body volution at its lower side; the umbilical cavity closed by a callosity; the shell, approaching the aperture, becoming lamellose; the lamellæ elevated and imbricating. Surface marked by undulating transverse striæ and obscure revolving striæ, with obsolete parallel undulations. The lines of growth are strongly arched forward on the middle of the back of the shell." Hall, 1859.

Occurrence.—Oriskany Formation, Ridgely Member. Cumberland (fide Hall).

Collection.—American Museum of Natural History.

Platyceras sinuatum Hall ?

Plate LXXXIV, Figs. 5, 6

Platyceras sinuatum Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 314, pl. lv, figs. 5, 7; pl. lvii, fig. 2, 1861.

Description.—"Shell depressed, somewhat obliquely ovoid: volutions about three, contiguous, the last one becoming very ventricose, a little flattened on the upper side, and expanded laterally to the axis of the spire: aperture broad, campanulate; margin deeply sinuate. Surface marked by fine concentric or transverse lamellose striæ, and stronger wrinkles or folds. The striæ are abruptly bent backwards on the upper dorsal side, and a deep sinus marks the labrum: the lower side of the aperture is likewise deeply sinuate." Hall, 1859.

Occurrence.—Oriskany Formation, Ridgely Member. East side Nicholas Mountain.

Collection.—Maryland Geological Survey.

Platyceras trilobatum Hall ?

Plate LXXXIV, Figs. 7, 8

Platyceras trilobatum Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 316, pl. lvii, figs. 5*a*, *b*, *c*, 1861.

Description.—"Body of the shell obliquely or arcuately ovoid, trilobate: volutions three or four, the last one (or more) becoming free, gradually expanding to the aperture; the apex closely involved and rising above the plane of the outer volution, or sometimes on the same plane, concave towards the suture: aperture subangularly ovate, sinuate on the right and left sides, and the shell extended in front. Surface marked by two strong spiral depressions corresponding to the sinuosities of the aperture, and crossed by lamellose striæ which are strongly undulated on the sinuosities of the last volution, and are marked by other undulations on the earlier volutions, indicating former sinuosities in the margin of the aperture." Hall, 1859.

A specimen in the U. S. National Museum is much smaller than those figured by Hall, but in other respects closely resembling this species. The three sinuses are shown better by the undulating striæ on the surface than

by the aperture. It is referred, with hesitancy, to this species; the absence of the spire making identification uncertain.

Occurrence.—Helderberg Formation, New Scotland Member. Corriganville.

Collection.—U. S. National Museum.

Platyceras multisinuatum Hall

Plate LXXXV, Figs. 4-6

Platyceras multisinuatum Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 319, pl. lviii, figs. 8*a*, *b*, *c*, and 9*a*, *b*, 1861.

Description.—"Shell subdiscoid in the young state; apex nearly on a plane with the outer volution: volutions about three, the first ones minute; outer one becoming free, ventricose, rounded or scarcely angular below, somewhat flattened on the upper side, marked by several ridges and shallow depressions on the upper and dorsal side: aperture somewhat longitudinally oval; peristome sinuate, with a deeper sinuosity on the anterior margin. Surface marked by fine transverse striæ, which are strongly undulated on the inequalities of the shell, and crossed by fine longitudinal or revolving striæ." Hall, 1859.

A single individual has been observed which shows as nearly as can be seen, the features in the above description. Although this specimen is fragmentary, the peculiar markings of the species leave no doubt as to the identity of the former. The revolving striæ are not observable.

Occurrence.—Helderberg Formation, New Scotland Member. Cumberland ?

Collection.—George M. Roeder.

Platyceras platystomum Hall ?

Plate LXXXV, Fig. 7

Platyceras platystomum Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 326, pl. lx, figs. 1*a*, *b*, 2; pl. lxi, figs. 1*a*, *b*, *c*, 1861.

Description.—"Shell obliquely depressed conical, arcuate on the upper part of the first volution; the apex obtuse, consisting of about a single close

volution: aperture expanded, campanulate, and sometimes slightly reflexed. Surface marked by longitudinal plications, which are more or less strongly developed, and are crossed by fine closely arranged lamellose striæ, which are often crowded into wrinkles upon the middle and lower part of the shell." Hall, 1859.

A poorly preserved specimen from the Oriskany is, with grave doubt, referred to this species. The general form of the shell agrees, in a measure, with published descriptions and figures of this species. However, the plications are not observable except faintly on the interior side of the body whorl. The shell has been silicified and portions have again been dissolved away and the apex is broken off, rendering exact determination impossible.

Occurrence.—Oriskany Formation, Ridgely Member. Knobly Mountain, West Virginia.

Collection.—Maryland Geological Survey.

Platyceras spirale Hall

Plate LXXXV, Figs. 8, 9

Platyceras spirale Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 331, pl. lxiii, figs. 4-9, 1861.

Platyceras spirale Meek and Worthen, 1868, Geol. Survey Ill., vol. iii, p. 389, pl. vii, figs. 12*a*, *b*, *c*.

Description.—"Shell spirally ascending: apex consisting of a single minute close volution, below which are one or two widely separated and gradually enlarging volutions: aperture spreading, rounded or broad oval; peristome sinuate. Apex and upper part of the shell smooth, or with only fine transverse striæ, more or less distinctly plicated on one side below with strong lamellose undulating striæ." Hall, 1859.

Length 2.25 cm.; diameter of aperture, 1.8 cm.

Occurrence.—Helderberg Formation, New Scotland Member. Corriganville.

Collection.—U. S. National Museum.

Platyceras gracile n. sp.

Plate LXXXV, Figs. 10-13

Description.—Shell spirally and obliquely ascending; whorls one or one and one-half; shell gracefully and spirally tapering regularly to an acute apex, the summit of which lies about in the plane of the right side of the aperture; surface marked by irregular growth lines which often tend toward irregular, low undulations; aperture slightly higher than wide; peristome not seen. Most of the specimens show irregular wide grooves extending spirally from the ventral side of the aperture half, or more, of the length of the shell.

This species has some resemblance to *P. tortuosum* Hall, but is easily separated by its much larger size, more rapid expansion, and by the greater obliquity of the apical portion of the shell.

Length 4.5 cm.; diameter of aperture 3.5 cm.

Occurrence.—Oriskany Formation, Ridgely Member. Cumberland, Maryland; Knobly Mountain, West Virginia.

Collection.—Maryland Geological Survey.

Platyceras subconicum n. sp.

Plate LXXXVI, Figs. 1-3

Description.—Shell arcuately to obliquely conical; whorls, one or a little more, free; shell expanding rapidly at first, then somewhat more gently; apex blunt, twisted so as to project on the right side of the shell; aperture subcircular; peristome not observed. Some individuals show a surface marked by faint irregular growth lines. Wide, obsolete, longitudinal ridges are seen on a few shells. The aperture is sometimes irregularly sinuous on the ventral side, due to an irregular crinkling of the shell.

This species was recognized as new by the late Dr. Rowe, and to it he applied the name *subconicum*. It seems, however, that he did not describe the species; but the name given by him is here retained.

Length about 4 cm.; diameter of aperture 4.3 cm.

Occurrence.—Oriskany Formation, Ridgely Member. Cumberland, Maryland; Knobly Mountain, West Virginia.

Collections.—Maryland Geological Survey, U. S. National Museum.

Platyceras newberryi Hall

Plate LXXXVI, Fig. 4

Platyceras newberryi Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 333, pl. lxiii, figs. 14*a-e*, 1861.

Description.—"Shell subdiscoidal, with the last volution expanded: volutions about three, nearly in the same plane; the first two minute and closely involved, the last one free, somewhat rapidly expanding, flattened upon the back and becoming ventricose towards the aperture: aperture rounded or broad oval. Surface marked by strong transverse or slightly oblique nodes or ridges upon the dorso-lateral angles of the last volution, about eleven or twelve on each side, which are sometimes connected by a low ridge across the back (the two upper volutions being rounded and free from such ridges). Entire surface marked by regular even thread-like longitudinal striæ." Hall, 1859.

A single individual of this species has been found in the state. Of its identity there is little if any doubt, but, as seen in the specimen figured, the transverse ridges are very oblique, due, in part at least, to distortion.

Height 1.5 cm.; diameter of aperture 2.3 cm.

Occurrence.—Oriskany Formation, Ridgely Member. Warren Point, Pennsylvania.

Collection.—Maryland Geological Survey.

Genus STROPHOSTYLUS Hall

Strophostylus transversus Hall

Plate LXXXVI, Figs. 5-7

Strophostylus transversus Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 470, pl. cxiv, figs. 1*a*, *b*, *c*, 1861.

Description.—"Shell obliquely ovate, symmetrical. Spire little elevated: volutions about four, the last one extremely ventricose and very much extended on the margin; aperture subcircular; outer lip very thin, curving downwards and spreading over the surface of the adjacent volution. Columellæ lip spirally grooved: suture canaliculate. Surface finely striated in direction parallel to the lines of growth, with a few more strongly marked imbricating lines of growth." Hall, 1859.

Length 3.75 cm.; maximum diameter 4.5 cm.

Occurrence.—Oriskany Formation, Ridgely Member. Cumberland (fide Hall).

Collection.—American Museum of Natural History.

Strophostylus matheri Hall

Plate LXXXVI, Figs. 8, 9

Strophostylus matheri Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 471, pl. cxviii, figs. 1*a*, *b*, 1861.

Description.—" Shell obliquely ovoid or subglobose; the spire elevated: volutions about four, the last comprising almost the entire bulk of the shell. Aperture subcircular, a little higher than wide: peristome continuous, thin, joining the adjacent volution on the lower side or becoming free on the posterior side, and joining the outer margin of the columellar lip. Volutions very symmetrically decreasing; suture canaliculate; the depression deepening towards the last volution, till, in older forms, the last volution is sometimes quite free at the aperture. Surface marked by fine transverse striæ, which, in older specimens, become towards the aperture elevated, lamellose, and imbricating." Hall, 1859.

Hall's type specimen of this species came from Cumberland. The writer has seen but a single individual.

Length 2.5 cm.; diameter 2.4 cm.

Occurrence.—Oriskany Formation, Ridgely Member. Cumberland, east side Nicholas Mountain.

Collection.—Maryland Geological Survey.

Genus DIAPHOROSTOMA Fischer

Diaphorostoma ventricosum (Conrad)

Plate LXXXVII, Figs. 1, 2

Platyostoma ventricosa Conrad, 1842, Jour. Acad. Nat. Sci., Phila., vol. viii, p. 275, pl. xvii, fig. 5.

Platyostoma ventricosa Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 300, pl. lv, figs. 9*a*, *b*, *c*, *d*; p. 469, pl. cxii, figs. 1-10; pl. cxiii, figs. 7, 8; pl. cxv, fig. 8, 1861.

Platyostoma ventricosa Nicholson, 1874, Rept. upon the Pal. of Province of Ontario, p. 117, pl. ii, fig. 4.

Diaphorostoma ventricosum Clarke, 1900, Mem. N. Y. State Mus., No. 3, vol. iii, p. 30, pl. iii, figs. 25-28.

Platyostoma ventricosa Weller, 1903, Geol. Survey, N. J., Pal., vol. iii, p. 361, pl. xlix, figs. 7-11.

Description.—"Globose: whorls somewhat scaliform, or flattened above; lower part of columella prominent; labrum reflected; width and length of aperture nearly equal." Conrad, 1842.

"Shell globose or depressed globose and often obliquely ovoid, varying in form. Spire moderately elevated, consisting of three or four volutions, the last of which is extremely ventricose; volutions flattened upon the upper side; aperture circular or subovate; columellar lip reflexed. Surface marked by fine closely arranged striæ parallel to the lines of growth." Hall, 1859.

Length of maximum form 7 cm.; diameter 9 cm.

This species is very common in the Oriskany of Maryland. Some forms of *Platyceras gebhardi* bear a strong resemblance to this form, but the latter always has an elevated spire which, with the prominence of the lower part of the columella, serves to distinguish the species.

Occurrence.—ORISKANY FORMATION, RIDGELY MEMBER. Cumberland, Hancock, east side Nicholas Mountain, Maryland; Warren Point, Pennsylvania; Knobly Mountain, West Virginia.

Collections.—Maryland Geological Survey, U. S. National Museum.

DIAPHOROSTOMA DEPRESSUM (Hall)

Plate LXXXVI, Figs. 11, 12

Platyostoma depressa Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 301, pl. lv, figs. 4*a*, 4*b*.

Description.—"Shell depressed globose. Spire short, little elevated above the body of the shell: volutions three or four, a little depressed at the suture and regularly curving on the top and sides; aperture round or transversely suboval. Surface somewhat lamellose-striate." Hall, 1859.

This species as found in Maryland is poorly preserved. Only about a half-dozen individuals have come under the notice of the writer, most of them being in the U. S. National Museum and having been identified by Schuchert.

Occurrence.—ORISKANY FORMATION, RIDGELY MEMBER. South end of Nicholas Mountain (?). HELDERBERG FORMATION, NEW SCOTLAND MEMBER. Corriganville.

Collections.—Maryland Geological Survey, U. S. National Museum.

Diaphorostoma desmatum Clarke

Plate LXXXVI, Figs. 13, 14

Diaphorostoma desmatum Clarke, 1900, Mem. N. Y. State Mus., vol. iii, No. 3, p. 29, pl. iii, figs. 13-19.
Platyostoma desmatum Weller, 1903, Pal. N. J., vol. iii, p. 262, pl. xlix, fig. 12.

Description.—The U. S. National Museum has a very small specimen of this species from the Lower Oriskany. The species lacks a definite description; what has been published being comparisons rather than descriptions. The specimen figured was identified by Schuchert.

Occurrence.—Oriskany Formation, Shriver Member. 21st Bridge.

Collection.—U. S. National Museum.

Order OPISTHOBRANCHIATA

Suborder CONULARIDA

Family TENTACULIDAE

Genus TENTACULITES Schlotheim

Tentaculites ? acus Clarke

Plate LXXXVII, Fig. 5

Tentaculites ? acus Clarke, 1900, Mem. N. Y. State Mus., No. 3, vol. iii, p. 28, pl. iii, figs. 1-7.

Description.—" Shells having as large size as those of *T. elongatus* but with the exterior surface smooth or with very faint, distant, broad, concentric depressions and fine, indistinct and somewhat irregular growth striæ. The internal cast is similar to that of *T. elongatus,* but has the constrictions less deep. Specimens of this species are not uncommon. The wall of this species is thick and cellular, and a transverse section gives two or more concentric circles at any plane, showing the ensheathment of the funnel-like divisions of the interior. This structure is much more pronounced than in any species of Tentaculites observed by the writer and, though more regular than in Cornulites, may prove to be of the same nature." Clarke, 1900.

The writer has seen but a single specimen of this species. The condition of preservation is such that no details could be learned further than those given by the author of the species.

Occurrence.—Helderberg Formation, Becraft Member. Warren Point, Pennsylvania.

Collection.—Maryland Geological Survey.

Tentaculites aculus Hall

Plate LXXXVII, Figs. 6, 7

Tentaculites aculus Hall, 1888, Nat. Hist. N. Y., Pal., vol. vii, p. 6 (supplement to vol. v), pl. cxiv, figs. 15-17.

Tentaculites acula ? Weller, 1903, Pal. N. J., vol. iii, p. 336, pl. xliii, fig. 11.

Description.—"This species is distinguished by the regular, equidistant annuli and the few annulations on the intervals." Hall, 1888.

Occurrence.—Oriskany Formation, Shriver Member. 21st Bridge, Cash Valley, North Branch.

Collections.—Maryland Geological Survey, U. S. National Museum.

Tentaculites elongatus Hall

Plate LXXXVII, Figs. 8-10

Tentaculites elongatus Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 136, pl. vi, figs. 16-21, 1861.

Tentaculites elongatus Hall, 1888, Nat. Hist. N. Y., Pal., vol. vii, p. 6 (supplement), pl. cxiv, fig. 14.

Tentaculites elongatus Clarke, 1900, Mem. N. Y. State Mus., No. 3, vol. iii, p. 27, pl. iii, figs. 8-12.

Tentaculites elongatus Weller, 1903, Pal. N. J., vol. iii, p. 295, pl. xxxii, fig. 4; p. 319; p. 363, pl. l, figs. 4, 5.

Description.—"Body extremely elongated and very gradually tapering to the apex, which is sometimes slightly curved; marked by strong, sharp annulations of which more than three occur in the space of the diameter of the tube. Section cylindrical. Surface ornamented by fine close annulating striæ. Length from one to three inches. Annulations four or five in the space of a quarter of an inch at the base of the larger specimens, and about nine in the same space near the apex." Hall, 1859.

It is not always easy to distinguish this species from *T. aculus;* but in the latter the annulations are more closely and regularly arranged, especially on the earlier portions of the shell. In New York this species occurs in both the Helderberg and the Oriskany.

Occurrence.—Helderberg Formation, Coeymans Member. Dawson. New Scotland Member. Devil's Backbone. Oriskany Formation, Shriver Member. Cumberland, west side of Queen's Point opposite Keyser, Winchester Road near Allegany Grove.

Collections.—Maryland Geological Survey, U. S. National Museum.

Class CEPHALOPODA

Subclass TETRABRANCHIATA

Order NAUTILOIDEA

Suborder ORTHOCHOANITES

Family ORTHOCERATIDAE

Genus ORTHOCERAS Breyn

Orthoceras longicameratum Hall

Plate LXXXVIII, Figs. 1-3

Orthoceras longicameratum Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 343, pl. lxx, fig. 1; pl. lxxi, figs. 1, 5, 1861.

Description.—"Shell elongated, very gradually tapering; chamber extremely elongated. Septa numerous, highly arched, about four or five in the space of the diameter of the shell. Siphuncle moniliform. Surface unknown." Hall, 1859.

The exact horizon is unknown.

Occurrence.—Helderberg Formation. Cumberland.

Collection.—U. S. National Museum.

ARTHROPODA

Subbranch BRANCHIATA

Class CRUSTACEA

Subclass TRILOBITA

Order OPISTHOPARIA

Family PROETIDAE

Genus PROËTUS Steininger

Proëtus cf. protuberans Hall

Plate LXXXIX, Figs. 2-4

Proëtus protuberans Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 351, pl. lxxiii, figs. 5-8, 1861.

Description.—" Entire form oblong elliptical. Head semicircular, very gibbous; the glabella very prominent, rounded in front, not distinctly lobed; the cheeks sloping abruptly from the eyes to the outer margin: posterior angles subacute (perhaps prolonged into spines in entire specimens); eyes prominent. Occipital annulation prominent; the furrow strong, and marked below each posterior angle of the glabella by a small tubercle. Thorax consisting of nine or ten articulations (the specimen being too imperfect for actual determination). The axis is very prominent, semicylindrical, and the lateral lobes nearly flat for a little distance from their origin, and then bending abruptly downwards. Pygidium semicircular: axis very prominent, marked (in the cast) by eight annulations; lateral lobes marked by four or five ribs. Surface granulate; the anterior border, and articulating surfaces of the axis striate: exfoliated surfaces striate." Hall, 1859.

Occurrence.—Helderberg Formation, New Scotland Member. Corriganville.

Collection.—American Museum of Natural History.

Genus CORDANIA Clarke

Cordania cyclurus (Hall and Clarke)

Plate LXXXIX, Figs. 5, 6

Phaëthonides cyclurus Hall and Clarke, 1888, Nat. Hist. N. Y., Pal., vol. vii, p. 137, pl. xxiv, figs. 26-28; pl. xxv, fig. 11.

Description.—" Cephalon. The intra-sutural portion, which is the only part known, indicates a semicircular outline for the head; frontal and lateral areas depressed and concave; frontal margin elevated, rising to the height of the glabella, broad, thickened and rounded. Palpebral lobes conspicuous. Glabella subpyriform, convex, slightly flattened above, bounded by a sulcus which is strong at the side and obsolete in front. Baso-lateral lobes strong; antero-lateral impressions well marked. Cheeks appressed and elevated along the lateral margins of the glabella. Thorax not observed. Pygidium semicircular; length to width as 1 to 2. Axis prominent, elevated and longitudinally arched; width less than one-third that of the shield, rapidly tapering to an apex just within the posterior border; composed of nine annulations which are transverse, rounded and separated by moderately broad sulci. Pleuræ evenly rounding to the flattened border, and bearing seven annulations, which are strongly sulcate. Border broad, depressed or flat. All the pleural annulations pass over the border to its edge, where the anterior and posterior limbs are of equal strength. Doublure broad.

" The cephalon shows traces of low pustules over the glabella, and upon the depressed frontal area, where they become elongate or lachrymate, sometimes anastomosing, leaving elongate depressions between them; the frontal border also bears an irregular row of conspicuous tubercles. The pygidium is marked by regularly arranged pustules; a median row upon the axis, bifurcating at the fifth or sixth annulation, thence backward continuing double until it becomes obsolete. Four rows of finer pustules are also visible on the axis, two on either side of the median row. The pleuræ bear three or four rows of small pustules, and the interspaces of the crust are minutely granulose, and punctate. The lower surface of the doublure is marked by faint radiating or venate striations." Hall and Clarke, 1888.

This species, as it occurs in Maryland, differs somewhat from Hall and Clarke's types in that the former have a somewhat longer glabella and the position of a single pair of side furrows is merely indicated by a pair of depressions on the sides of the glabella.

Occurrence.—Helderberg Formation, New Scotland (?) Member. Cumberland.

Collection.—George M. Roeder.

Genus CYATHASPIS Burmeister

Cyathaspis australis n. sp.

Plate LXXXIX, Figs. 7, 8

Description.—Cephalon. Semielliptical transversely; length to width about as 1 to 2; genal angles (imperfect in only specimen seen) produced, diverging posteriorly; border smooth, thickened, a broad well-defined sulcus lying concentrically within the thickened border and extending from base to base of the genal angles. Facial sutures originating in posterior margin, extending directly and very obliquely inward and forward to the palpebral lobes, thence directed obliquely outward and forward to marginal sulcus where they curve sharply inward and forward to the frontal margin. Glabella U-shaped, moderately and regularly convex, bounded by a deep, well-defined sulcus which widens markedly near the palpebral lobes; basal lobes pyriform, slightly alternate anteriorly, oblique, conspicuous; baso-lateral furrows well marked, very convex on inner side, antero-lateral furrows obsolete; frontal area regularly convex to marginal sulcus.

Eyes large, very prominent, visual area semi-circular, palpebral lobes small. Cheeks small, sloping steeply to marginal sulcus; a well-defined furrow running from base of genal angles obliquely inward and forward, almost parallel to facial suture, to posterior extremity of palpebral lobe; occipital furrow narrow but sharply marked; occipital ring moderately broad on axis, tapering laterally. Thorax elongate, subequally trilobate; segments thirteen (?); axis well arched, but slightly depressed medially, of same width to two-thirds or more of the distance from cephalon, then

tapering posteriorly; pleuræ depressed on interior portions, abruptly deflected distally; each annulation bearing a longitudinal furrow which runs from near the anterior side in the axial region obliquely to the middle of the annulation, becoming obsolete distally; the smaller anterior portion of each annulation with a small spine at fulcral line as in *C. crespedota.* Pygidium not seen. Surface of cephalon smooth; that of the thorax covered by small irregular pustules, which are more numerous on the axis.

This species bears a close resemblance to *C. crespedota* of the Hamilton of New York, but is quite distinct. *C. cælebs* of the Lower Helderberg of that state differs widely from this species especially in the features of the axis of the thorax. Only a single individual of this genus has so far been reported from the Lower Devonian of Maryland. The exact horizon is unknown.

Occurrence.—Helderberg Formation. Cumberland.

Collection.—George M. Roeder.

Order PROPARIA

Family CALYMENIDAE

Genus HOMALONOTUS Koenig

Homalonotus swartzi n. sp.

Plate LXXXIX, Figs. 10-12; Plate XC, Figs. 1, 2

Description.—Cephalon unknown. Thorax very broad, trilobation obsolete, axial portion broadly arched, pleural portions steeply descending; segments curving gently forward in axial portion; posterior portion of each segment broad axially, tapering gradually toward fulcra; transverse suture of each segment of nearly constant width, a narrower and less steep secondary suture anterior to and parallel with the primary; pleuræ bending suddenly downward at fulcra, the transverse suture curving forward distally, leaving the posterior portion of the segment very broad. Pygidium large, subtriangular in outline, lateral margins at base nearly rectilinear, posterior extremity not seen; faintly trilobate, the faint longitudinal furrows making with each other an angle of about 40°; axis very

broad, depressed, annulations ten or eleven, low and broad, arching broadly anteriorly; pleuræ profoundly arched along fulcra and incurved at base, each bearing ten annulations which are broad, low, nearly direct, and becoming obsolete distally. Dimensions of pygidium: Length about 82 mm.; width 72 mm.

A cast of a pygidium, which is taken as the type of the species, was discovered by Dr. C. K. Swartz and is named for him. In size this species is comparable to *H. major* Whitfield. The above incomplete description of the thorax is from a single thoracic segment from Miller's Spring, West Virginia. The pygidium and the segment presumably belong to the same species. Both occur in the Oriskany, and are of large proportions and the fulcra are of about equal sharpness.

Occurrence.—Oriskany Formation, Ridgely Member. Sand quarry 4 miles southwest of Hancock (pygidium), Maryland; Miller's Spring (thoracic segment of glabella), West Virginia.

Collection.—Maryland Geological Survey.

Homalonotus vanuxemi Hall

Plate LXXXIX, Figs. 13-15; Plate XC, Fig. 3

Homalonotus vanuxemi Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 352, pl. lxxiii, figs. 9-14, 1861.

Homalonotus vanuxemi Hall and Clarke, 1888, *ibidem*, vol. vii, p. 11, pl. v*b*, figs. 1, 2.

Homalonotus vanuxemi Weller, 1903, Pal. N. J., vol. iii, p. 321, pl. xxxix, figs. 7, 8; p. 338, pl. xliv, figs. 4-7.

Description.—"Thorax long: sides subparallel, the middle lobe flattened on the exterior surface; articulations arching forward; longitudinal furrows faintly defined, being a simple undulation in the articulations; lateral lobes narrow, the articulations bent abruptly downwards at the sides. Pygidium subtriangular with the articulating side much longer and broadly curving, extremely convex: axis prominent in the young specimens, and becoming subdued in older ones; width, at its upper extremity, equal to that of each of the lateral lobes. Annulations fourteen or fifteen in the cast, and twelve ribs visible on each of the lateral lobes. Surface of the test punctate and striato-punctate: cast punctate." Hall, 1859.

Cephalon convex depressed, having the shape of a flaring U, lateral lines rectilinear, making with each other an angle of about 54°, anterior margin somewhat broadly rounded. Length to width about as 2 to 3; genal angles rather abruptly but regularly rounded. Facial sutures originating in genal angle nearer the lateral margin, thence running obliquely forward, rounding and passing inward parallel to posterior margin of cephalon toward points posterior to the eyes, thence again obliquely inward to the eyes, thence forward to anterior margin. No transverse suture observed, but may be present.

Glabella subescutcheonoid, broader posteriorly, lateral margins almost rectilinear, but slightly concave outwards, anterior angles rounded, posterior angles sharp, length five-eighths, or less, that of the cephalon, lateral furrows undefined in specimens observed. Cheeks free, sinuous on surface and abruptly deflected marginally. Eyes situated on large elevated protuberances which are slightly elliptical parallel to the lateral margin of the cephalon and each bounded by a wide shallow furrow which is less definite adjacent to lateral margin of the cephalon. Visual areas small, nearly circular, but slightly elongate parallel to the longer axis of the protuberances upon which they are situated.

The description is from two specimens belonging to the U. S. National Museum from near Franklin, Pendleton County, West Virginia. One shows the genal angles well, but neither has the anterior extremity of the cephalon. So far as the writer knows these two specimens and a fragment in the New York State Museum are the only specimens of the cephalon of this species yet discovered.

Occurrence.—Oriskany Formation, Ridgely Member. Knobly Mountain near Cumberland, Maryland; opposite Franklin, West Virginia.

Collections.—Maryland Geological Survey, U. S. National Museum.

Family PHACOPIDAE

Genus PHACOPS Emmrich

Phacops logani Hall

Plate XCI, Figs. 1-4

Phacops logani Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 353, pl. lxxiii, figs. 15-25, 1861.

Phacops logani Weller, 1903, Pal. N. J., vol. iii, p. 231, pl. xl, figs. 3, 4.

Description.—" General form elliptical. Head semicircular in outline, broadly concave above, with the posterior angles curved and declining more abruptly. Glabella somewhat pentagonal; length and greatest breadth nearly in the proportion of three to four; very prominent in front, projecting beyond the rudimentary frontal limb, which becomes more developed on each side, and below which is a defined groove, marking the limits of the lower side of the cephalic test. Upper surface convex, gibbous in front, having two pairs of transverse grooves, the middle and posterior ones of which are but faintly defined; while the third or anterior ones, extending from the inner angle of the eye backwards, and a little inwards, are scarcely conspicuous, and, on many specimens, not observable. First annular furrow strongly defined, and sometimes with a small tubercle at the summit: first or intercalated annulation narrow and well defined, and terminated at each extremity by a strong oblong tubercle, which is wider than the annulations, and usually marked by two pustules at the summit, one on each side of the center. Occipital furrow wider and more strongly defined than in the intercalated one, slightly sinuous, and terminating in a deep cavity at each extremity: occipital annulation broad and strong, slightly sinuate at the extremities, and, when entire, marked by one larger central pustule and several smaller ones.

Eyes of medium size, their summit less elevated than the glabella, extending backwards to the line of the occipital furrow, composed of seventeen vertical ranges of lenses; the entire number of lenses in full-grown specimens about one hundred, and varying in the specimens examined from ninety-three to one hundred and three.

" The axis of the thorax is prominent, and narrower than each of the lateral lobes; the annulations furnished with a prominent node at each extremity. The lateral lobes are flat or somewhat concave towards the axis, the articulations bending abruptly downwards from the middle towards the extremities: each articulation strongly grooved, the groove extending beyond the curvature. Pygidium semicircular; the axis prominent, with about nine annulations; the lateral lobes having about five or six ribs, each with a groove along the center. Surface of the glabella pustulose, and of the articulations granulose, with some larger granules or

pustules. The crust is thin, and the interior of the glabella shows distinct cavities corresponding to the external pustules. Hypostoma hastate; the buccal extremity obtuse, with a minute central point." Hall, 1859.

Occurrence.—Helderberg Formation, New Scotland Member. Devil's Backbone, Corriganville, Maryland; Cedar Cliff, West Virginia.

Collections.—Maryland Geological Survey, U. S. National Museum.

Phacops sp ?

Plate XCI, Figs. 5-7

Description.—Two pygidia and a larger cephalon from the Oriskany are too poorly preserved to determine or describe. They are associated in the brown sandstone south of Cumberland and are assumed as belonging to the same species.

Occurrence.—Oriskany Formation, Ridgely Member. Cumberland.

Collection.—George M. Roeder.

Genus DALMANITES Emmrich

Dalmanites multiannulatus n. sp.

Plate XCI, Figs. 12-15; Plate XCII; Plate XCIII, Fig. 1

Description.—Complete cephalon not seen. Fragments show the following characters: Convex, depressed; a broad concave border extends from one genal angle to the other; within and concentric with this is a narrower arched ridge; with and concentric with this ridge is a second concave furrow narrower than the first; glabella large, becoming narrower posteriorly; frontal lobe depressed, broadly elliptical transversely, surrounded by a broad, shallow furrow except at the posterior extremity; first lateral lobe much larger than the others, subtriangular; second lobe smaller than the first and larger than the third; third lobe narrow, having about the same width as the occipital ring; first and second lobes almost coalesced towards their outward extremities, a slight tendency towards coalescence likewise observable between the second and third lobes; second and third lobes extending obliquely inward and forward, the former being more oblique than the latter and both suddenly excavate at their inner extremities; eyes large, elevated, bounded (at least exteriorly) by a broad,

concave furrow; genal angles much extended, rectilinear, or slightly concave outwardly, till near the posterior extremity where they bend noticeably inward; neck furrows wide and deep; hypostoma with highly developed ornamentation, the anterior extremity possessing a process which bifurcates a short distance beyond the general outline of the hypostoma, each branch extending arcuately outward and forward (25 mm. in the specimen figured); on either side of this bifurcating process are three shorter obtuse projecting processes each in succession being more and more subdued. Thorax not seen.

Pygidium convex, greatly depressed, outline broadly triangular, the lateral margins gently convex outwards; axis broad, depressed, tapering gradually to a rounded apex posteriorly; dorsal furrows broad, deep, interrupted by the transverse furrows except posteriorly, and making with each other an angle of about 20°; axis with 19 transverse, broad, subrectilinear ridges, the intervening furrows being broad and shallow axially, but suddenly deeper at about half the distance from the axial line to the dorsal furrows; pleuræ with about 16 transverse tips, the 8 or 9 anterior of which are divided by a well-marked, broad, longitudinal groove, the remaining posterior ones being more or less acute; the transverse ribs are arched slightly forward till near the lateral margins when they bend suddenly backwards. No caudal spine observed.

The surface of the cephalon is ornamented with numerous irregularly placed, rather small pustules. The axial portion of the pygidium bears on each of the transverse ridges several spines more crowded toward the dorsal furrows, but with no regular arrangement observable; the plural ribs studded with pustules varying greatly in size and occupying usually a medial position on the rib.

The cephala are fragments and are completely separated from their pygidia. Each belongs to a large species. Relying then on the highly probable conjecture of identity of localities and on the large size of the individuals, the writer has referred the pygidia and the fragmentary cephala to the same species. It must remain for future investigation to show the truth or falsity of such reference.

The species presents features of interest in the character of the frontal ornamentation. Dr. J. M. Clarke has discussed this feature of the genus.[1] The present species seems to have close affinities with *D. bicornis* Hall, of the Waldron fauna, as regards the bifurcating frontal process, but it shows a much higher development of this feature than does any other species of this genus of which the writer knows.

Occurrence.—Oriskany Formation, Ridgely Member. Knobly Mountain near Cumberland.

Collections.—Maryland Geological Survey, U. S. National Museum.

Dalmanites latus n. sp.

Plate XCIII, Fig. 2

Description.—Cephalon and thorax unknown. Pygidium broadly ovate in outline, the lateral margin incurving rapidly on approaching the posterior extremity which in outline has the form of a low arc; axis of medium width, tapering gradually to a subacute terminus; dorsal furrows narrow, direct, deeply incised by transverse furrows especially anteriorly; segments 17, narrow; transverse ridges narrow, erect, convex anteriorly, wider than the intervening furrows, probably not ornamented; pleurae 14 in number, slightly curved for about three-fourths of their length from the dorsal furrows, then curving suddenly backward; ridges narrow, about as wide as the intervening furrows, erect, each with a longitudinal groove in the middle which becomes obsolete on the posterior ribs, and bears an occasional pustule.

This species is founded on a single pygidium in the U. S. National Museum. Its broadly ovate outline, the number and character of the annulations mark it as a distinct species.

Occurrence.—Oriskany Formation, Ridgely Member. Cumberland.

Collection.—U. S. National Museum.

[1] The Oriskany Fauna of Becraft Mountain. Mem. N. Y. State Mus., vol. iii, No. 3, 1900, pp. 16, *et. seq.*

Subgenus SYNPHORIA

Dalmanites (Synphoria) stemmatus Clarke

Plate XCIII, Fig. 3

Dalmanites (*Synphoria*) *stemmatus* Clarke, 1900, Mem. N. Y. State Mus., vol. iii, No. 3, p. 15, pl. i, figs. 6-16; pl. ii, figs. 1, 2.

Description.—"Species attaining considerable size. Cephalon convex, abruptly sloping to the genal margins. Genal extremities somewhat produced but relatively short and terminating in broad obtuse angles. Dorsal furrow deep except at the junction of the glabellar lobes with the palpebral lobe, where it becomes shallow and very much elevated. Frontal lobe of glabella large, rounded in front, slightly elongated at the axial extremity, but not projecting beyond the frontal border or facial suture. First lateral furrows long, deep and oblique, extending nearly three-fourths the diameter of the lobe. Glabellar surface behind the frontal lobe slightly if at all depressed medially. Second and third lobes wholly confluent at their extremities, often but a remnant of the second lateral furrows remaining. Together these coalesced lobes have a subtriangular or subclavate outline and are convex and elevated at their distal extremities, rising above the full height of the glabella and almost to the height of the palpebral lobe. The third lobes are small and narrow, making an annular segment, varying but little in width; their extremities are almost concealed beneath the projecting lobes in front. Occipital furrow deep; occipital segment long and very much arched; no central spine or tubercle. Cheeks with steep lateral slopes; somewhat concave within the thickened margin. Furrows beneath the eyes deep, narrow with elevated margin having a vertical, outward slope. Occipital furrow widening from the dorsal furrows outward and coming to a rather abrupt termination without meeting the submarginal depression of the cheeks or extending on the genal expansion. Eyes large, elevated, the palpebrum higher than the palpebral lobe.

"The thickened border bears a row of crenulations or crescentic ornamental processes, which are the most extended at the anterior extremity;

here also the anterior three of these processes are somewhat coalesced. From this extremity may be counted, on both sides of the terminal process, from 12 to 15 similar processes, becoming uniformly smaller toward the genal extremities and finally disappearing altogether at or near the lateral termination of the facial suture. In smaller specimens the number of these processes may be considerably less.

" The surface of the cephalon is ornamented, on the frontal lobe of the glabella, with coarse pustules of varying size; this lobe also bears the elongate median scar which occurs in many species of the genus. The coalesced second and third lobes are also pustulose, but less strongly. The cheeks directly beneath the eyes bear traces of low ramifying grooves similar to those found in *Dal. pleuroptyx* of the Helderbergian fauna and *Dal. anchiops* of the Schoharie grit. Thorax not observed. Pygidium very broadly triangular, the length and width being as 2 to 3. The margin curves slightly outward on each side and terminates behind in a broad, rounded extremity which is slightly elongated, but is not produced into a spine. The axis bears 10 or 11 annulations, and the pleuræ 9 or 10. The ribs are undivided by a median groove and are without coarse tubercles." Clarke, 1900.

A specimen in the collection of Mr. Gordon is referred to this species. The determination has been made from the cast of the cephalon. Crushing has somewhat deformed the cast, but the features are still fairly definite, except on the anterior extremity. The agreement with the description of *D. stemmatus* is very close, but the following differences are noted: (1) The occipital furrow is parallel to the posterior margin of the cephalon for less than one-half the distance from the axis as in typical forms. Thence the posterior margin diverges as is not true of typical forms, making thus with the occipital furrow and the lateral margins scalene areas. (2) The genal angle is somewhat more acute. (3) The third side-lobes bear each a small node on the distal ends.

Occurrence.—Oriskany Formation, Ridgely Member. Cumberland.

Collection.—Robert H. Gordon.

Subgenus CORYCEPHALUS

Dalmanites (Corycephalus) dentatus Barrett ?

Plate XCIII, Fig. 4

Dalmanites dentata Barrett, 1876, Amer. Jour. Sci., 3d ser., vol. xi, p. 200, pl.
Dalmanites dentata Barrett, 1876, *ibid.*, vol. xii, p. 70.
Dalmanites (*Corycephalus*) *dentatus* Hall and Clarke, 1888, Nat. Hist. N. Y., Pal., vol. vii, p. 58, pl. xi*a*, figs. 4-6.
Dalmanites dentatus Weller, 1903, Geol. Survey N. J., Pal., vol. iii, p. 339, pl. xliv, figs. 1-3.

Description.—"Head subcrescentiform, the lateral and anterior margins forming a parabolic curve, the genal angles extended into rather blunt spines. Glabella depressed convex, broadest in front, surrounded by a well-defined dorsal furrow, frontal lobe broader than long, subelliptical to subrhomboidal in outline. First pair of lateral furrows broad and deep, extending obliquely backward from the dorsal furrow and connected across the median portion of the glabella by a shallow depression. First and second lateral lobes partially coalescent externally by the shallowing of the second lateral furrows, the third pair of lateral lobes entirely separate from the second. Second and third pairs of lateral furrows indistinctly continuous across the median portion of the glabella by slight depressions. Occipital furrow sharply defined, continuous across the glabella and extending out upon the cheeks. Occipital segment of about the same width, but a little higher than the posterior lateral lobes. Cheeks convex in general contour, with a slightly thickened marginal border. Eyes large, subcrescentiform, their summits as high or higher than the glabella, their anterior extremities opposite the first and their posterior extremities opposite the third lateral furrows of the glabella, bounded externally around the base of the faceted surface by a sharp depression, beyond which is a subangular ridge. Between this ridge and the slightly thickened cheek margin the surface is concave. The entire lateral and anterior margin of the head is ornamented with a continuous series of from twenty-five to thirty-five triangular, tooth-like processes, largest in front and decreasing regularly in size to the genal angles. The surface of the glabella and those portions of the cheeks lying between the eyes and the glabella, except in the furrows, is covered with rather coarse, irregularly arranged, circular tubercles, the outer portions of the cheeks, includ-

ing the marginal denticles, being finely papillose. Thorax consisting of eleven segments, the axis a little less than one-third the entire width, pleuræ extended into sharp, posteriorly pointing spines. Pygidium subtriangular in outline, the posterior extremity produced into a dorsally curving, attenuate spine, a little less than one-fourth the total pygidial length. Axis depressed convex, indistinctly subangular along its median line, about one-fourth the entire width of the pygidium at its anterior margin, its sides nearly straight, gradually converging to the obtusely rounded posterior extremity, which lies a little anterior to the base of the posterior pygidial spine. Pleuræ with no conspicuous marginal border, flattened above, becoming rather strongly convex in the middle, and then sloping away to the lateral margins with a slightly convex surface. Axial segments fifteen in number; pleural segments grooved, eleven in number, curving rather abruptly backward as they approach the margin, the two or three posterior ones nearly straight. Each segment of the pygidium marked by a more or less irregular line of tubercles." Weller, 1903.

The pygidium figured has a striking resemblance to published figures and descriptions of this species in the duplicate ribs and in the tubercles on the axial lobe. But except for the width of the axis, it might with equal propriety be referred to *D. bisignatus* Clarke. It is too imperfect for accurate determination.

Occurrence.—Oriskany Formation, Ridgely Member. Evick Gap, opposite Franklin, Pendleton County, West Virginia.

Collection.—U. S. National Museum.

Dalmanites micrurus (Green)

Plate XCI, Figs. 10, 11

Asaphus micrurus Green, 1832, Mon. Trilobites of North America, p. 56, cast 19, fig. 3.

Dalmania micrurus Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 359, pl. lxxiv, figs. 13-20, 1861.

Description.—Hall describes this species as follows: "Pygidium triangular, convex, somewhat abruptly sloping at the sides, acute, attenuate behind. Axis very prominent, faintly subangular in the middle above, and regularly rounded towards the posterior extremity, rigid, scarcely declining below, and abruptly elevated from the posterior marginal

border; a narrow angular ridge extending from the extremity of the axis into the acute spiniform caudal termination. The number of articulations in the axis is twenty or twenty-one, which are strongly defined, and some of the anterior ones slightly bent forward, and sometimes a little more prominent or almost nodose in the middle. Each of the lateral lobes is marked by fourteen or fifteen (and, in one example, sixteen) ribs; the anterior ones very regularly arching, while about four or five of the posterior ones are turned backwards, approaching the parallel of the axis. Each rib is marked by a narrow groove along its summit, continued to where the ribs coalesce in the narrow marginal rim. The direction of this suture, near the origin of the ribs, is a little below the middle, but, in its course, approaches more nearly the upper margin. Surface granulose, with a row of stronger granules or small pustules on each side of the furrow marking the ribs, and still stronger ones on the middle of the annulations of the axis." Hall, 1859.

The glabella is more truncate than in *D. pleuroptyx*. The chief and most obvious distinction as figured and described by Hall is in the sharpness of definition of the axial annulations of the pygidium, but even this is variable. This axis is also more prominent than in *D. pleuroptyx*, especially the posterior extremity.

Occurrence.—Helderberg Formation, New Scotland (?) Member. Cumberland. Oriskany Formation, Ridgely Member. Cumberland.

Collection.—U. S. National Museum.

Subgenus CHASMOPS McCoy

Dalmanites (Chasmops) anchiops (Green)

Plate XCIII, Fig. 5

Calymene anchiops Green, 1832, Mon. of Trilobites of North America, p. 35.
Asaphus laticostatus Green, 1832, *ibid.*, p. 45.
Phacops anchiops Burmeister, 1846, Die Organisation der Trilobiten, p. 90.
Dalmania anchiops Hall, 1861, Description of New Species of Fossils, etc., p. 55.
Dalmania anchiops Hall, 1862, 15th Ann. Rept. N. Y. State Cab. Nat. Hist., p. 83.
Dalmanites anchiops Hall, 1876, Illus. Devonian Fossils, pl. ix, figs. 1, 3-6, 10, 12, 13; pl. x, figs. 6-14.
Dalmanites (Chasmops) anchiops Hall and Clarke, 1888, Nat. Hist. N. Y., Pal., vol. vii, p. 59, pl. ix, figs. 1-6, 10, 12, 13; pl. x, figs. 1-14.

Description.—"General form and proportions. Body subelliptical in outline, more or less produced at the extremities. Surface depressed convex, distinctly trilobate; lateral margins deflected and subparallel. Length (including caudal spine) to width as 2 to 1. Cephalon relatively short, length about one-third the width; outline crescentic, slightly produced on the frontal margin. Surface evenly convex. Border narrow anteriorly, bearing in front of the glabella five to seven low crenulations or undulations, which become wider and thicker upon the cheeks, and produced at the genal angles into stout and rapidly tapering spines, which reach the third thoracic segment. Doublure wide and deep at the genal angles, narrowing at the lateral margins, and extending into a relatively narrow epistoma in front. Facial sutures normal.

"Glabella elongate, subpentagonal, widest anteriorly, depressed convex; bounded on all sides by low sulci. Anterior lobe large, subrhomboidal; first pair of lateral furrows long, inclined backward; second pair obsolete, except at their proximal extremities, where they appear upon the cast as two deep pits; third pair transverse or inclined slightly forward, almost obsolete at their distal extremities; first and second glabellar lobes coalescent, forming a single pair of large convex lobes, whose elevation exceeds that of the frontal lobe; third glabellar lobes narrow, depressed and relatively inconspicuous. Occipital furrow narrow on the axis, becoming broader and deeper on the cheeks, occipital ring prominent and bearing short and sharp central spine, narrowing to the axial furrows, thence rapidly widening to the genal spines.

"Eyes lunate, large and elevated considerably above the summit of the glabella, and closely appressed against its coalescent first and second lobes. Visual surface with numerous corneal lenses, the single specimen (a young individual) in which they may be enumerated, showing eighteen rows, counting diagonally from the lower posterior margin, and one hundred and ninety-two lenses. Palpebrum scarcely prominent; palpebral lobe depressed and sloping abruptly to the narrow and elevated palpebral furrow. Cheeks sloping abruptly from the ocular node to the thickened and somewhat flattened margin. A deep sinus which is

stronger in old individuals, bounds the ocular node and flattens the subjacent portion of the cheek.

"Thorax subrectangular, length to width as 4 to 5. Surface depressed convex. Axis relatively narrow, widest at about the fifth segment, thence regularly tapering to the pygidium. Pleuræ relatively broad, flat for about one-half their width and thence rounded to the lateral margins. Each segment has a slight forward curve along the axial line, being sulcate on the pleuræ and having the anterior limb abbreviated by the beveled planes of articulation. Pygidium subtriangular, depressed convex or flattened. Posterior extremity produced into a stout, upwardly curved spine, usually short, but sometimes equaling the pygidium in length. Length, including the caudal spine, equal to the width.

"Axis having less than one-third the width of the shield on the anterior extremity, regularly tapering to an obtuse, broadly rounded termination, and composed of from nine to fourteen broad, flat, transverse annulations.

"Pleuræ broad and rounding more or less abruptly to the margins, bearing eight or nine wide, flattened annulations, which become obsolete just within the border. Wherever the crust is retained the annulations are seen to be faintly grooved near their distal extremities, but in the usual condition of preservation as casts of the lower surface, the tendency to duplication is not often apparent. Doublure narrow on the sides, rapidly widening toward the posterior spine, where it extends forward as far as the termination of the axis. The caudal spine is not infrequently broken away from the margin of the doublure, giving the caudal shield a semicircular outline.

"Surface ornamentation. The surface of the cephalon, within the border and occipital ring, is covered by strong tubercles, which are closely disposed over the cheeks and more scattered on the glabella. In old individuals these tubercles extend to the margin, and the orbital ridge of the cheek becomes covered with fine granulations. The surface of the thorax and pygidium is smooth or finely granulose. Pygidia of young individuals show low nodes or tubercles upon the pleuræ, apparently arranged in three or four oblique rows with indications of similar ornamentation upon the axis." Hall and Clarke, 1888.

From the Oriskany comes a nearly complete pygidium which bears a close resemblance to all and Clarke's description and figures. This pygidium has, however, a much stronger duplication of the pleural annulations and the axial annulations are arched slightly medially. Nevertheless, the specimen must be placed here for the present, though it may ultimately be shown to belong to another species.

Occurrence.—Oriskany Formation, Ridgely Member. Locality unknown.

Collection.—Maryland Geological Survey.

Subgenus HAUSMANNIA

Dalmanites (Hausmannia) pleuroptyx (Green)

Plate XCIII, Figs. 6-10

Asaphus pleuroptyx Green, 1832, Mon. of Trilobites of North America, p. 55.
Dalmania pleuroptyx Hall, 1859, Nat. Hist. N. Y., Pal., vol. iii, p. 356, pl. lxxiv, figs. 5 ?, 9 ? (not figs. 1-4, 6-8, 10-12); pl. lxxv, fig. 1 ?, 1861.
Dalmanites (Hausmannia), pleuroptyx Hall and Clarke, 1888, *ibidem*, vol. vii, p. 28, pl. xi*a*, figs. 1-3.
Dalmanites pleuroptyx Weller, 1903, Pal. N. J., vol. iii, p. 295, pl. xxxii, fig. 1.

Description.—" Head semicircular, with the posterior side concave, and the posterior angles prolonged to the fifth or sixth articulation of the thorax: frontal limb slightly concave, thickened at the margin. Glabella convex in front; length from the annulation to the anterior of the frontal lobe, equal to the width of the frontal lobe, which is transversely oval: transverse furrows strongly marked, the anterior one more deeply than the others, and passing imperceptibly into the depression which circumscribes the frontal lobe: anterior lobe expanding, and becoming prominent towards the inner angle of the eye; the central lobe a little wider than the posterior one. Occipital furrow narrow, shallow in the middle; its continuation in the posterior furrow of the cheeks being very strongly defined, and becoming wider towards the exterior margin.

" Eyes large, prominent, having an elevation of ten ranges of lenses, while laterally there are thirty-seven ranges: the entire number of lenses, in a specimen of medium size, is 311. Between the lenses there is a small round granule marking each of the angles of a hexagon, which circumscribes the lens. The entire rim of the eye is much elevated above the cen-

tral portion or palpebral lobe, and a deeper groove in the outer limb. Hypostoma subhastate, with scarcely perceptible inequalities on the margin.

"Thorax with the axis somewhat abruptly convex, and about three-fourths as wide as one of the lateral lobes, the articulations on each side terminated by a broad node. The articulations of the lateral lobes of the thorax marked by a deep longitudinal furrow, which leaves the elevated portion above and below nearly equal, and the extremities bending rather abruptly downwards.

"Pygidium triangular, transversely convex; the posterior extremity acute, attenuate; the axis a little depressed towards the lower extremity, which rises in strong relief above the border below. The axis is gradually attenuate, the width at the posterior extremity being about one-third as great as at the anterior extremity, which is about five-eighths as wide as the greatest width of the lateral lobe at its upper margin: its outline is curved and sometimes scarcely carinate, the latter feature more often seen in the casts. The number of articulations in the axis is seventeen; and in each of the lateral lobes are eleven to thirteen ribs which are little wider than the furrows which separate them; the whole bending downwards towards the outer extremities, and uniting in a thickened border. Each rib of the lateral lobe is marked by a longitudinal groove parallel with the margins, and a little nearer to the upper than the lower margin.

"Surface granulose, the granules being somewhat stronger on the more prominent parts of the head and in front of the eyes, while on the thorax and pygidium there is usually a stronger row of granules along the lower margins of the articulations. The granulose marking, however, is subject to considerable variation, either from accidental or other causes; and some specimens of the pygidium present a fine granulose texture, visible only under a lens." Hall, 1859.

Occurrence.—Helderberg Formation, Coeymans Member. Devil's Backbone, Dawson. New Scotland Member. Devil's Backbone, Corriganville, Dawson, Tonoloway ?

Collections.—Maryland Geological Survey, U. S. National Museum.

LIFE

Daniel Webster Ohern was born near Magnon, Illinois, June 2, 1870. His early life was spent in Piatt County, Illinois. His early education was obtained in the common schools. In 1891 he removed to Lincoln, Nebraska, where he held a position as salesman in a department store till 1893, when he entered Cotner University, near Lincoln. He entered Drake University, at Des Moines, Iowa, in the autumn of 1896 and was graduated from that institution in 1898 with the degree of Bachelor of Arts. He was Fellow and graduate student in Greek in West Virginia University in 1898-1899, and in the latter year received the degree of Master of Arts. He was Assistant in Greek in the same institution, 1899-1901, and Instructor, 1901-1903. In the fall of 1903 he entered Johns Hopkins University, where he has since pursued graduate work in geology under Professor Clark, Professor Reid, Professor Mathews, and Dr. Swartz. During the field seasons of 1905 and 1906, and at other irregular times, he has been in the employ of the Maryland Geological Survey. During the college years 1903-1905 he was laboratory assistant in Johns Hopkins University, Scholar in 1905-1906, and Fellow in 1907.